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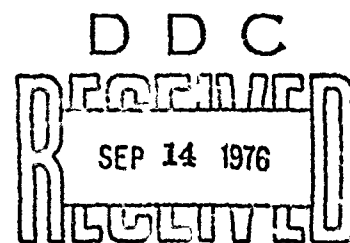


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**USAF BIOENVIRONMENTAL NOISE DATA
HANDBOOK
Volume 4
MA-1A Power Unit, Gas Turbine Engine
(AirResearch)**

JUNE 1975

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AEROSPACE MEDICAL RESEARCH LABORATORY
AEROSPACE MEDICAL DIVISION
Air Force Systems Command
Wright-Patterson Air Force Base, Ohio 45433

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FOR THE COMMANDER



HENNING L. VON GIERKE
Director
Biodynamics and Bionics Division
Aerospace Medical Research Laboratory

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The MA-1A Power Unit is a turbine engine driven source of pneumatic power for starting aircraft jet engines and furnishing heated pneumatic power to other types of pneumatically operated equipment. This report provides measured and extrapolated data defining the bioacoustic environments produced by this unit operating outdoors on a concrete apron at normal rated/loaded conditions. Near-field data are reported for 37 locations in a wide variety of		

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physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Far-field data measured at 36 locations are normalized to standard meteorological conditions and extrapolated from 5-800 meters to derive sets of equal-value contours for these same seven acoustic measures as functions of angle and distance from the source. Refer to Volume 1 of this handbook, "USAF Bioenvironmental Noise Data Handbook, Vol 1: Organization, Content and Application," AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc.

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PREFACE

This report was prepared by the Biodynamic Environment Branch Aerospace Medical Research Laboratory, under Project/Task 723104, Measurement of Noise and Vibration Environments of Air Force Operations.

The author acknowledges the efforts of Mr. Robert T. England and Mr. Robert G. Powell who conducted the field measurements, and Mr. John N. Cole who established the data analysis requirements and assisted in the preparation of this report. Mr. Henry Mohlman and Mr. David Eilerman of the University of Dayton assisted in the mechanics of data processing; and Mrs. Norma Peachy and Mr. Mike Patterson prepared the graphics.

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FAR-FIELD NOISE

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FAR-FIELD NOISE

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INTRODUCTION

The MA-1A Power Unit is a turbine engine-driven source of pneumatic power for starting aircraft jet engines and furnishing heated pneumatic power to other types of pneumatically-operated equipment. This unit is manufactured by the AiResearch Manufacturing Company.

This volume provides measured and extrapolated data defining the bioacoustic environments produced by this unit. Such data are essential to evaluate ear protection requirements, limiting personnel exposure times, voice communication capabilities, and annoyance problems associated with operation of the MA-1A power unit.

This volume is one of a series published by the Aerospace Medical Research Laboratory (AMRL) under the same report number (AMRL-TR-75-50) as a multi-volume handbook that quantifies the noise environments produced at flight/ground crew locations and in surrounding communities by operations of Air Force aircraft and aerospace ground equipment. The far-field, community-type, noise data in the handbook describe the noise produced during *ground operations* of aircraft, aerospace ground equipment, and other ground-based equipment or facilities.

Volume 1 of this handbook discusses the objectives and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. Volume 2 provides a method and data for adjusting the handbook's far-field noise data, which are for standard meteorological conditions (15C temperature, 70% rel humidity, 0.760 meters Hg barometric pressure) to derive comparable data for other meteorological conditions. *Refer to Volumes 1 and 2* (references 1 and 2) for such information because it is not repeated in other handbook volumes.

A cumulative index lists those aerospace systems contained in the handbook, and identifies the specific volumes containing each type of environmental noise data available (i.e., inflight/flight crew and passenger noise, near-field/ground crew noise, far-field/community noise). Volume numbers are assigned sequentially as individual volumes are published. This index is periodically updated as individual volumes are published, and is available upon request from AMRL/BBE, Wright-Patterson AFB, OH 45433. Organizations on the distribution list for the handbook will automatically receive a copy of the updated index as it is generated.

Direct any questions concerning the technical data in this report and other handbook volumes to: AMRL/BBE, Wright-Patterson AFB, OH 45433; Autovon 78-53675 or 78-53664; Commercial (513) 255-3675 or (513) 255-3664.

NEAR-FIELD NOISE

MEASUREMENTS

A standard MA-1A power unit was operated outdoors on a concrete apron at normal rated conditions of 42,500 RPM with no significant sound-reflective surfaces present except the ground plane. Table 1 notes the surface meteorological conditions at the time of measurement.

Figure 1 identifies 72 noise measurement locations at a height of 1.5 meters above the concrete apron (nominal ear level of ground crew). The 0 degree reference direction passes through the tow bar. The 36 locations on the two inner circles are in the acoustic near-field of the source where the sound wave fronts generally do not spherically diverge and the source appears to be spatially distributed (i.e., not a point source). Consequently, these near-field data cannot be extrapolated to longer distances but do properly define the levels at locations close to the unit.

Near-field measurements were also made at ear level at the operator control panel. Table 1 lists the numeric/alphabetic designator used on the data pages in this report to identify the operator measurement location and test condition. The designator 1/A means operator location 1 and test condition A. Such a descriptor is essential in many handbook volumes that involve multiple combinations of locations/conditions. It is used in this report to maintain format consistency.

RESULTS

The measured data presented in Table 2 define the sound pressure levels (SPL) produced by the MA-1A unit at the 37 specified, near-field locations. This table includes the overall, 1/3 octave band, and octave band levels. From these data one can calculate the variety of measures in Table 3 which are widely used to assess the effects of noise on personnel and their performance.

For data at other intermediate near-field locations (i.e., for radial distances less than 5 meters) you can interpolate between the 72 measured data points. All near-field data are for the meteorological conditions at the time of test but are valid for all typical airbase meteorology because of the short distances over which the sound is propagated.

TABLE 1
MEASUREMENT LOCATION AND TEST CONDITION
FOR OPERATOR NOISE MEASUREMENTS

MA-1A Power Unit, Gas Turbine Engine (AIResearch)
Eglin AFB, 26 Jul 1971
Serial # 283550DEF0509

Measurement Location

1 Operator Control Panel

AGE Operation

A 42,500 RPM

Meteorology

Temperature 29 C
Bar Pressure .760 M Hg
Rel Humidity 80%

FAR-FIELD NOISE

MEASUREMENTS

Noise measurements were also made on the same MA-1A unit under the same test conditions at the outer circle locations on Figure 1. These 36 locations are in the acoustic far-field of the source where the sound wave fronts spherically diverge and the unit may be regarded as a point noise source. Under these far-field conditions, the measured data can be extrapolated to longer distances.

RESULTS

Table 4 lists the overall and 1/3 octave band SPL measured at the 36 far-field locations under the meteorological conditions at the time of test. These data were normalized to 10 meters distance and standard meteorological conditions (15C temperature, 70% rel humidity, 0.760 meter Hg barometric pressure) and used to derive the graphic data in Figure 2 which provides a compact summary of the far-field noise characteristics of the MA-1A power unit in a standard format.

These measured data were also used to derive sets of equal noise contours (Figures 3 through 9) describing seven different measures of noise as functions of angle and distance from the source for standard day meteorology. Note that Figure 8 contours identify limiting exposure times for personnel. Missing data points on any of the contours are the result of eliminating measured data which contained excessive influence of spurious background noise present at the time of measurement. In some cases, contour levels at these missing data points were estimated and indicated with dashed lines.

Volume 2 of the handbook defines the influence of meteorology on far field noise environments and provides, if required, the factors necessary to adjust the handbook standard meteorological day data.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																IDENTIFICATION:		
1/3 OCTAVE BAND																		
2																	OMEGA 3.2	
NOISE SOURCE/SUBJECT: (OPERATION:)																TEST 71-020-270		
HA-1A POWER UNIT, GAS ()																RUN 01		
TURBINE ENGINE (42,500 RPM)																19 AUG 74		
(AIRESEARCH) ()																		
NEAR FIELD NOISE LEVELS ()																PAGE F1		

FREQ (HZ)	DISTANCE (M)-->	2	0	20	40	60	80	100	120	140	160	180	200	220	240			
ANGLE (DEG)-->																		
25	85	86	84	84	85	85	84	82	84	86	88	85	86	84	85			
31.5	83	84	86	86	84	84	84	83	83	85	85	85	86	87	86			
40	86	86	85	85	86	86	85	86	85	85	86	83	87	86	86			
50	84	85	85	84	84	84	84	84	84	84	84	84	85	86	85			
63	86	87	85	84	84	84	85	85	86	85	86	86	86	87	87			
80	84	83	84	84	84	84	85	83	84	84	86	85	86	86	86			
100	85	84	86	86	86	86	85	87	86	90	90	90	92	91	90			
125	95	95	95	95	95	95	95	97	97	98	100	99	100	98	97			
160	99	98	98	98	98	99	101	103	103	104	104	104	105	103	102			
200	92	92	95	91	93	97	94	95	98	100	100	101	102	100	99			
250	89	91	93	94	94	94	94	95	98	98	98	99	101	99	96			
315	97	95	94	94	92	92	94	96	97	99	100	100	101	98	98			
400	98	97	98	98	98	97	98	100	101	102	103	104	102	100	99			
500	90	89	87	87	85	85	87	88	90	93	95	94	96	95	92			
630	91	92	91	91	90	90	86	87	88	95	98	99	99	96	94			
800	89	91	91	89	89	89	89	90	91	93	95	97	98	95	93			
1020	85	88	87	88	86	86	88	90	89	88	87	89	89	88	88			
1250	83	85	85	85	85	88	86	85	86	88	87	92	90	88	86			
1600	86	85	87	87	87	87	87	86	87	90	95	95	94	90	87			
2000	88	88	88	88	88	88	85	86	90	95	99	97	101	98	91			
2500	90	91	92	90	92	90	87	91	94	100	101	100	103	100	95			
3150	92	96	95	93	92	93	92	92	94	102	105	106	107	104	97			
4000	94	97	97	96	94	96	94	93	97	104	106	106	107	105	97			
5000	95	98	99	98	95	98	95	95	97	103	105	106	106	104	98			
6300	96	106	101	100	97	96	97	96	98	103	105	106	106	105	98			
8000	108	114	116	113	109	110	109	110	107	108	109	109	109	109	109			
10000	111	117	120	117	113	114	113	114	109	109	109	107	107	110	113			
OVERALL	114	119	122	119	119	115	115	116	113	115	116	116	117	116	115			

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE																		

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)													IDENTIFICATION:	
2 1/3 OCTAVE BAND														
NOISE SOURCE/SUBJECT: (OPERATION:)														
HA-1A POWER UNIT, GAS ()													OMEGA 3.2	
TURBINE ENGINE (42,300 RPM)													TEST 71-020-270	
(LAISEARCH) ()													RUN 02	
NEAR FIELD NOISE LEVELS ()													19 AUG 74	
													PAGE F2	
FREQ (HZ)	DISTANCE (M)-->	2	280	300	320	2	1	1	1	1	1	1	1	1
ANGLE (DEG)-->	260	2	2	2	2	2	20	40	60	80	100	120	140	
25	84	84	84	84	87	86	88	88	90	90	90	91	94	
31.5	85	84	84	85	87	86	88	89	91	89	91	91	93	
40	87	87	87	87	87	87	90	90	90	89	90	93	94	
50	85	85	86	86	87	86	88	89	89	89	89	90	92	
63	88	87	86	87	87	87	90	90	90	90	91	92	94	
80	86	86	86	84	84	84	88	89	90	90	92	94	95	
100	88	87	87	87	87	86	92	92	94	95	96	98	99	
125	96	97	97	97	97	96	99	99	100	101	102	104	106	
160	100	100	99	100	100	100	99	101	103	105	107	108	110	
200	97	94	93	91	92	93	96	99	100	100	100	103	105	
250	95	94	92	91	90	96	96	96	97	97	99	101	103	
315	97	96	97	97	97	99	99	99	100	99	100	102	104	
400	101	100	102	100	99	100	101	100	100	98	99	102	104	
500	88	86	89	90	89	89	93	94	93	94	96	98	99	
630	88	90	90	93	92	92	89	97	95	94	94	97	102	
800	89	89	90	92	90	90	91	97	94	92	94	97	100	
1000	87	87	87	88	86	86	90	92	91	92	94	97	96	
1250	84	87	86	87	85	85	90	93	95	91	91	91	90	
1600	87	87	86	87	85	85	92	94	94	92	92	91	95	
2000	88	89	90	90	88	90	95	96	94	92	92	93	100	
2500	90	89	91	93	91	91	96	98	96	93	93	97	106	
3150	92	94	94	96	94	94	97	101	98	97	97	100	106	
4000	93	95	97	98	96	96	99	102	102	96	99	101	109	
5000	94	96	99	100	97	100	104	105	104	100	99	101	109	
6300	95	97	100	105	99	99	102	108	106	102	102	102	110	
8000	110	115	116	115	113	113	116	124	119	117	115	112	113	
10000	114	119	120	119	116	116	120	128	121	121	120	116	112	
OVERALL	116	120	121	121	118	118	122	129	123	123	121	119	120	
LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.														

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																					IDENTIFICATION:	
2 1/3 OCTAVE BAND																						
NOISE SOURCE/SUBJECT:																						
(OPERATION:																						
(MA-1A POWER UNIT, GAS																					OMEGA 3.2	
(TURBINE ENGINE																						
(42,500 RPM																					TEST 71-020-270	
((AIRESEARCH)																					RUN 03	
(NEAR FIELD NOISE LEVELS																					19 AUG 74	
(PAGE F3	
DISTANCE (M)-->																					1	
ANGLE (DEG)-->																					1	
FREQ (HZ)																					1	
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TABLE 1 MEASURED SOUND PRESSURE LEVEL (DB)														IDENTIFICATION:	
2															
NOISE SOURCE/SUBJECT: (OPERATION:															
HA-1A POWER UNIT, GAS ((42,500 RPM															
TURBINE ENGINE (((
(AIRESEARCH) (((
NEAR FIELD NOISE LEVELS (((
FREQ (HZ)	DISTANCE (M) -->	2	20	40	60	80	100	120	140	160	180	200	220	240	
31.5	ANGLE (DEG) -->	0	89	90	90	89	89	89	90	91	89	91	91	90	
63			89	90	89	89	89	89	89	90	90	90	91	91	
125			101	100	101	102	104	104	105	105	105	106	105	103	
250			98	98	98	100	101	102	104	104	105	106	104	102	
500			99	99	99	98	100	102	103	104	105	105	102	101	
1000			91	94	93	93	94	94	95	96	99	99	96	95	
2000			93	93	94	91	93	96	101	103	102	105	102	97	
4000			98	102	102	98	98	101	108	110	111	111	109	102	
8000			113	118	121	114	115	111	112	112	112	112	113	114	
OVERALL			114	119	122	119	115	113	115	116	116	117	116	115	

MEASURED SOUND PRESSURE LEVEL (DB)					
TABLE:	OCTAVE BAND	OPERATION:			
2					
NOISE SOURCE/SUBJECT:					
(MA-1A POWER UNIT, GAS)					
(TURBINE ENGINE)					
((AIRESARCH))					
NEAR FIELD NOISE LEVELS					
FREQ (HZ)	DISTANCE (M)-->	2	260		
	ANGLE (DEG)-->				
31.5		90	91	92	93
63		102	99	101	103
125		101	100	93	94
250		92	93	94	102
500		93	100	120	121
1000		98	120	115	116
2000		115	116	120	121
4000		116	120	121	121
8000		116	120	121	121
OVERALL					

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)										IDENTIFICATION:	
OCTAVE BAND											
2										OMEGA 3.2	
NOISE SOURCE/SUBJECT: (OPERATION:)										TEST 71-020-270	
HA-1A POWER UNIT, GAS ()										RUN 03	
TURBINE ENGINE (42,500 RPM)										19 AUG 74	
(AIRESEARCH) ()											
NEAR FIELD NOISE LEVELS ()										PAGE J3	
DISTANCE (M) --> 1										1 OPERATOR LOCATION	
ANGLE (DEG) --> 160										TEST CONDITION	
FREQ (HZ)										1/A	
31.5	98	98	99	97	98	94	94	94	93	93	93
63	99	99	100	99	98	96	95	95	93	93	93
125	112	112	112	109	108	105	104	104	103	103	103
250	110	112	111	108	107	102	102	101	101	101	101
500	108	112	110	108	105	100	101	103	101	101	101
1000	103	105	105	102	101	96	97	99	96	95	95
2000	109	110	111	108	99	97	99	102	100	99	99
4000	117	119	117	113	107	103	107	109	106	104	104
8000	118	120	119	118	119	125	125	128	120	122	122
OVERALL	122	123	123	121	120	125	125	128	120	122	122

TABLE: MEASURES OF HUMAN NOISE EXPOSURE																IDENTIFICATION:	
3																	
NOISE SOURCE/SUBJECT: (OPERATION:)																OMEGA 3.2	
HA-1A POWER UNIT, GAS ()																TEST 71-020-270	
TURBINE ENGINE (42,500 RPM)																RUN 01	
(AIRESEARCH) ()																19 AUG 74	
NEAR FIELD NOISE LEVELS ()																PAGE H1	
DISTANCE (M)--> 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2																	
ANGLE (DEG)--> 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																	
HAZARD/PROTECTION																	
C-WEIGHTED OVERALL SOUND LEVEL (OASLC IN DB) AT EAR																	
A-WEIGHTED OVERALL SOUND LEVEL (OASLA IN DB) AT EAR																	
MAXIMUM PERMISSIBLE TIME (T IN MINUTES) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)																	
NO PROTECTION																	
OASLC																	
OASLA																	
T																	
MINIMUM QPL EAR MUFFS																	
OASLA*																	
T																	
AMERICAN OPTICAL 1700 EAR MUFFS																	
OASLA*																	
T																	
V-51R EAR PLUGS																	
OASLA*																	
T																	
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS																	
OASLA*																	
T																	
H-133 GROUND COMMUNICATION UNIT																	
OASLA*																	
T																	
COMMUNICATION																	
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)																	
PSIL																	
ANNOYANCE																	
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNOB)																	
TONE CORRECTION (C IN DB)																	
PNLT																	
C																	

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.
P ADDITIONAL EAR PROTECTION REQUIRED.

TABLE: MEASURES OF HUMAN NOISE EXPOSURE														IDENTIFICATION:	
3															
NOISE SOURCE/SUBJECT: (OPERATION:)														OMEGA 3.2	
HA-1A POWER UNIT, GAS ()														TEST 71-020-270	
TURBINE ENGINE ()														RUN 02	
(AIRESEARCH) ()														19 AUG 74	
NEAR FIELD NOISE LEVELS ()														PAGE H2	
DISTANCE (M) --> 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1															
ANGLE (DEG) --> 260 260 260 260 260 260 260 260 260 260 260 260 260 260 100 100 100 100 100 100 140															
HAZARD/PROTECTION															
C-WEIGHTED OVERALL SOUND LEVEL (OASLC IN OBC) AT EAR															
A-WEIGHTED OVERALL SOUND LEVEL (OASLA IN DBA) AT EAR															
MAXIMUM PERMISSIBLE TIME (T IN MINUTES) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)															
NO PROTECTION															
OASLC	112	117	118	117	115	115	118	121	125	125	120	119	118	117	118
OASLA	113	118	119	119	116	116	120	122	127	127	121	120	119	116	118
T	3.2	P	P	P	P	P	P	P	P	P	P	P	P	P	P
MINIMUM QPL EAR HUFFS															
OASLA*	91	96	96	96	93	93	97	100	104	104	98	98	97	95	95
T	143	60	60	60	101	101	50	30	15	15	42	42	50	71	71
AMERICAN OPTICAL 1700 EAR HUFFS															
OASLA*	89	93	94	94	91	91	95	97	102	102	96	96	94	92	91
T	202	101	85	85	143	143	71	50	21	21	60	60	85	120	143
V-51R EAR PLUGS															
OASLA*	85	90	90	90	87	87	91	94	98	98	93	92	91	89	89
T	404	170	170	170	285	285	143	85	42	42	101	120	143	202	202
AMERICAN OPTICAL 1700 EAR HUFFS PLUS V-51R EAR PLUGS															
OASLA*	75	80	81	81	78	78	82	84	89	89	83	83	81	78	78
T	960	960	807	807	960	960	679	480	202	202	571	571	807	960	960
H-133 GROUND COMMUNICATION UNIT															
OASLA*	85	89	90	90	87	87	91	94	98	98	92	92	90	88	90
T	404	202	170	170	285	285	143	85	42	42	120	120	170	240	170
COMMUNICATION															
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)															
PSIL	95	95	95	97	95	95	98	101	101	101	100	98	99	101	105
ANNNOYANCE															
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)															
TONE CORRECTION (C IN DB)															
PNLT	127	130	131	131	128	132	132	134	138	138	133	132	132	131	133
C	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.
P ADDITIONAL EAR PROTECTION REQUIRED.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																			IDENTIFICATION:			
1/3 OCTAVE BAND																						
DISTANCE = 5 METERS																						
NOISE SOURCE/SUBJECT:																						
HA-1A POWER UNIT, GAS																						
TURBINE ENGINE																						
(AIRESEARCH)																						
FAR FIELD NOISE LEVELS																						
OPERATION:																						
(42,500 RPM																						
METEOROLOGY:																						
TEMP = 29 C																						
BAR PRESS = .760 M HG																						
REL HUMID = 80 %																						
PAGE 2																						
FREQ	ANGLE (DEGREES)																					
(HZ)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180			
25	79	79	79	79	81	80	80	79	79	81	79	77	77	78	77	80	80	81	79			
31.5	80	81	80	82	82	81	81	81	80	82	80	81	81	82	80	81	82	81	80			
40	85	85	85	86	85	84	84	84	84	85	84	83	83	84	83	83	82	83	82			
50	80	82	81	81	80	82	80	80	80	80	80	79	81	80	80	79	79	79	79			
63	84	84	84	83	84	84	82	83	82	82	81	80	81	81	81	81	81	81	80	81		
80	83	83	83	83	84	82	83	82	82	82	81	80	82	80	81	80	80	80	80	80		
100	83	84	83	83	82	82	81	82	81	82	82	82	81	82	82	82	82	83	83	82		
125	81	81	81	80	80	82	83	85	86	87	87	86	86	87	87	86	87	88	86			
160	83	83	83	85	86	87	88	89	89	89	88	87	88	89	89	89	89	90	89			
200	82	83	82	83	82	83	82	81	80	80	80	81	81	83	83	83	84	85	85			
250	84	84	84	84	83	82	83	83	83	83	83	85	85	87	87	88	89	89	89			
315	93	92	92	90	89	89	90	90	90	91	91	93	92	94	94	95	95	95	96			
400	96	96	95	94	94	94	94	94	94	95	95	96	97	98	99	100	101	101	101			
500	83	83	83	85	86	88	87	85	85	84	84	83	88	89	89	89	90	92	90			
630	88	88	85	84	84	83	83	82	82	83	84	85	86	88	88	88	90	90	91			
800	84	84	85	85	85	85	86	84	84	84	85	86	86	88	88	90	90	90	91			
1000	81	83	84	84	83	84	84	85	85	84	85	86	87	87	86	87	89	87	89			
1250	82	82	83	83	83	83	84	83	84	83	84	83	84	85	85	83	86	85	88			
1600	80	81	82	82	83	83	83	83	83	82	82	82	82	83	85	86	87	88	88	90		
2000	85	87	86	87	87	86	86	85	85	85	86	86	88	90	91	95	96	95	94			
2500	88	88	88	88	88	88	88	87	87	86	88	89	90	91	95	96	96	95	94			
3150	87	87	88	88	89	88	87	86	87	85	86	87	89	91	93	95	95	96	95			
4000	88	88	90	89	89	90	89	87	87	87	87	89	90	93	95	96	97	97	96			
5000	88	88	90	90	91	91	90	90	88	87	88	88	89	92	93	94	94	95	95			
6300	92	91	93	93	93	94	94	91	91	90	90	91	92	93	94	95	96	96	97			
8000	106	106	106	108	109	109	108	106	107	106	105	106	105	103	104	101	101	99	100			
10000	110	109	110	112	112	112	111	110	111	110	108	109	108	105	107	104	103	100	100			
OVERALL	112	111	112	114	114	114	113	112	113	112	110	111	110	109	110	109	109	108	108			

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (dB)																	IDENTIFICATION:	
4																	OMEGA 1.3	
1/3 OCTAVE BAND																	TEST 71-020-270	
DISTANCE = 5 METERS																	RUN 02	
NOISE SOURCE/SUBJECT:																		
HA-1A POWER UNIT, GAS																	29 C	
TURBINE ENGINE																	BAR PRESS = .760 H HG	
(AIRESEARCH)																	REL HUMID = 80 %	
FAR FIELD NOISE LEVELS																	PAGE 2	
ANGLE (DEGREES)																		
FREQ (HZ)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	
25	81	78	80	81	83	80	83	82	82	79	80	80	80	79	79	79	79	
31.5	79	78	80	81	82	79	82	82	82	80	82	81	80	81	81	81	80	
40	81	80	80	82	83	81	82	81	83	84	84	84	84	84	84	84	84	
50	80	80	79	80	81	80	80	80	81	80	82	81	82	81	81	82	81	
63	81	81	81	82	82	83	81	85	83	83	84	83	85	84	83	84	85	
80	80	80	80	82	82	82	82	83	83	83	83	83	83	83	83	84	83	
100	83	81	82	82	83	82	82	81	82	83	83	82	83	83	82	83	83	
125	86	86	85	86	85	85	86	86	86	87	86	83	83	81	80	80	82	
160	89	89	89	88	88	86	85	84	86	88	87	87	86	87	85	84	83	
200	84	84	84	83	83	82	82	80	80	79	79	79	78	80	81	82	82	
250	89	88	88	88	87	86	85	83	85	84	85	84	83	83	82	83	83	
315	94	94	93	93	92	92	91	89	88	88	90	90	89	89	88	90	91	
400	101	100	98	97	95	95	93	93	92	90	94	94	93	92	91	92	94	
500	92	91	91	91	90	89	88	86	84	83	83	83	83	84	84	84	83	
630	90	90	88	87	85	85	84	83	85	85	86	86	85	86	86	83	84	
800	88	91	89	87	87	87	86	85	85	85	85	85	84	84	85	82	81	
1000	88	88	86	86	86	85	84	83	84	83	83	82	82	83	82	82	79	
1250	88	86	84	85	84	84	84	83	82	82	83	83	83	82	83	82	80	
1600	89	87	87	87	85	84	84	81	80	82	83	83	84	82	83	81	79	
2000	92	93	95	92	90	88	86	85	83	85	85	86	87	86	85	84	85	
2500	94	96	96	95	93	91	88	87	86	86	87	87	88	88	88	88	87	
3150	96	95	95	96	93	90	87	87	86	86	85	86	87	88	88	87	86	
4000	96	97	97	94	92	90	87	86	86	86	87	87	88	89	89	89	87	
5000	94	95	95	94	91	89	87	87	86	87	88	88	90	89	89	89	89	
6300	95	96	96	95	92	92	90	89	87	90	90	91	93	94	93	91	92	
8000	100	101	102	103	103	105	105	106	104	103	107	106	108	107	107	106	109	
10000	100	103	105	106	106	109	108	110	108	106	110	109	111	110	111	108	113	
OVERALL	108	108	109	109	109	111	110	111	109	108	112	111	113	112	113	111	115	

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

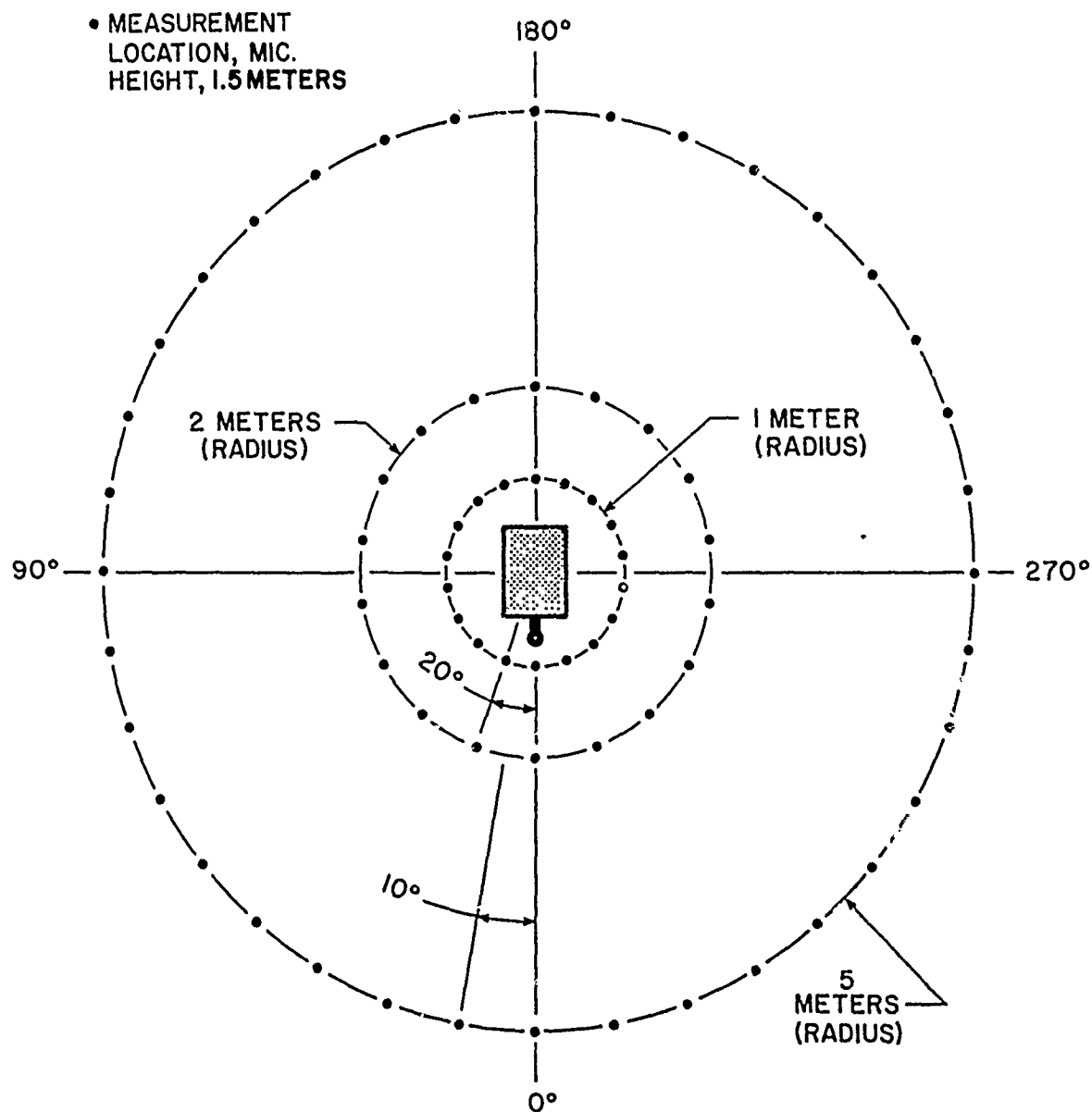
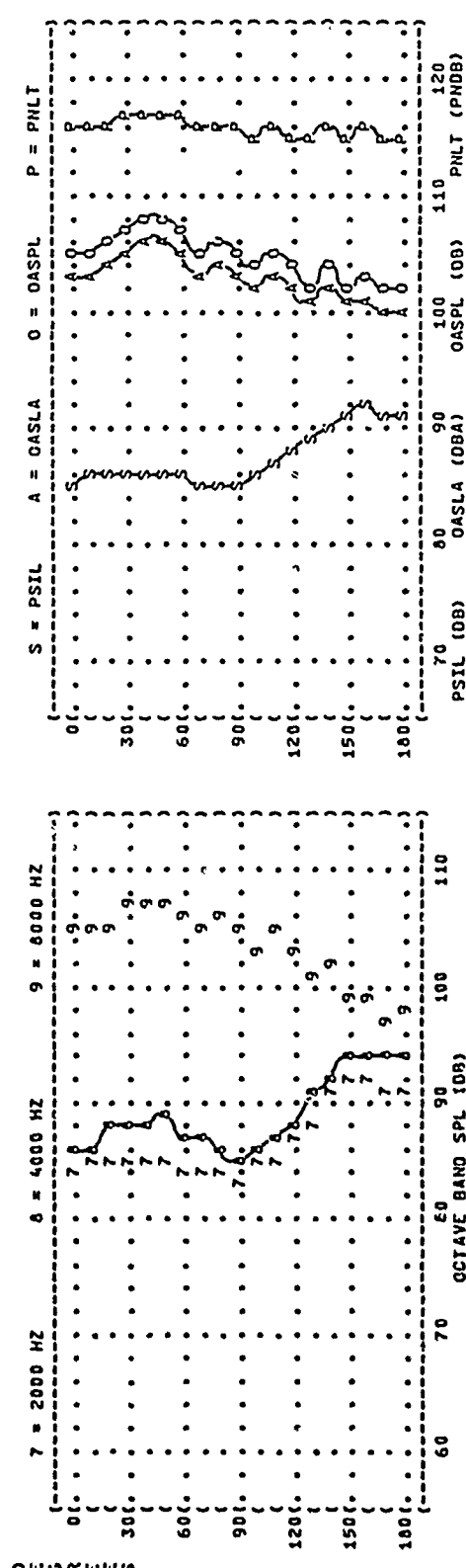
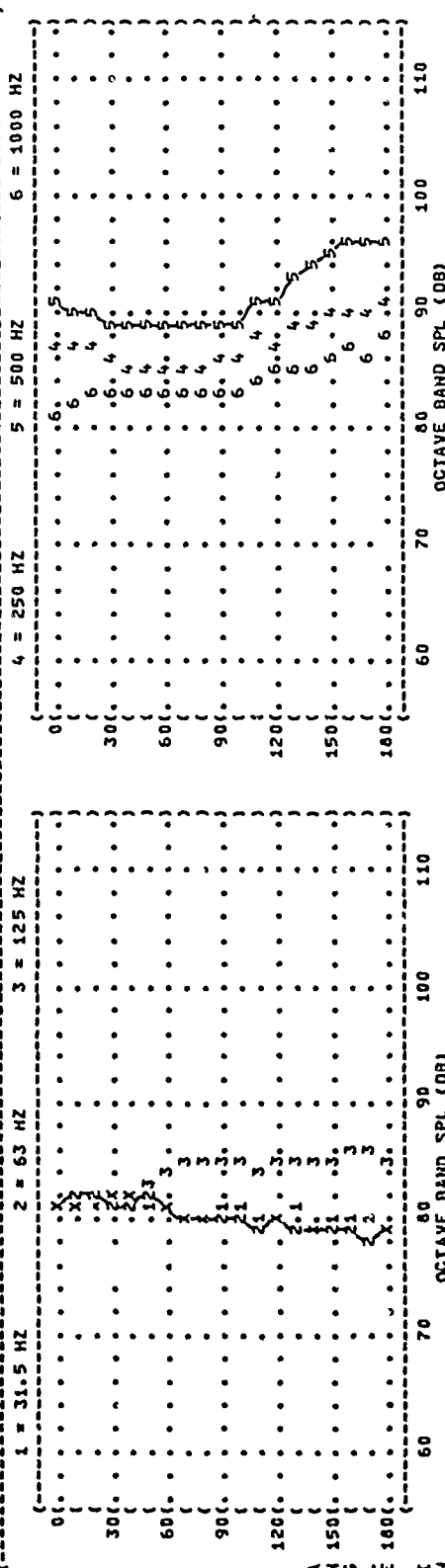
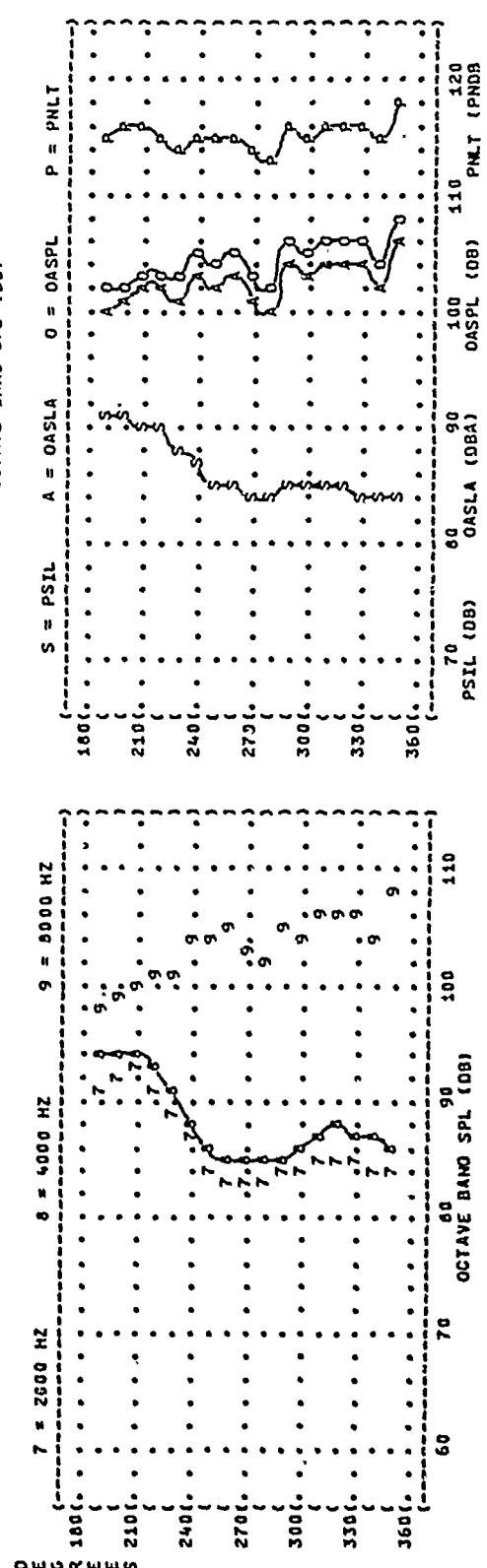
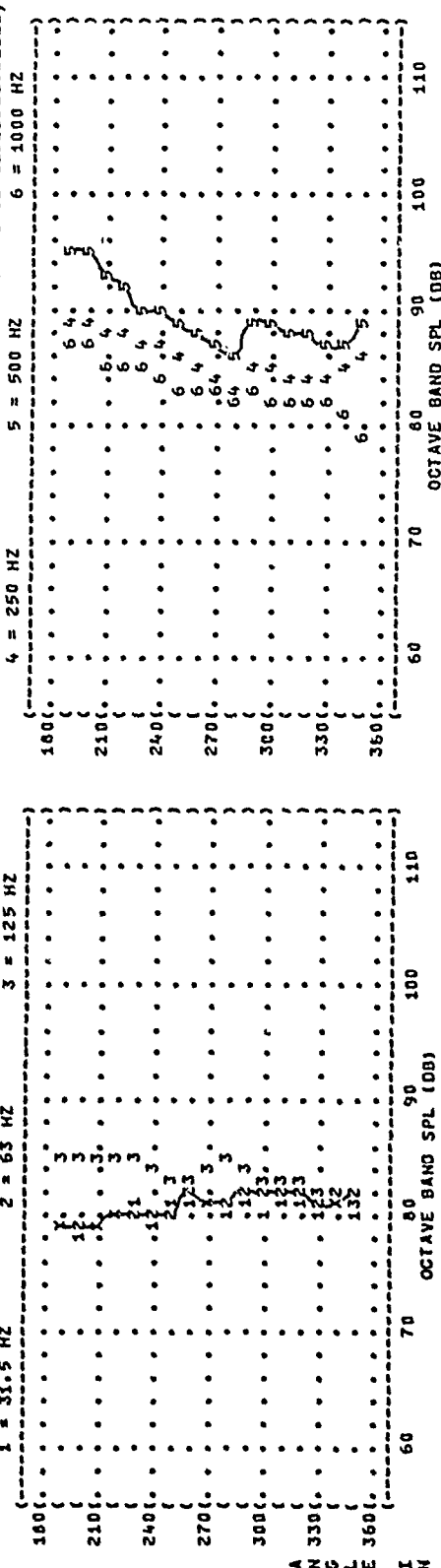


Figure 1. Measurement Locations

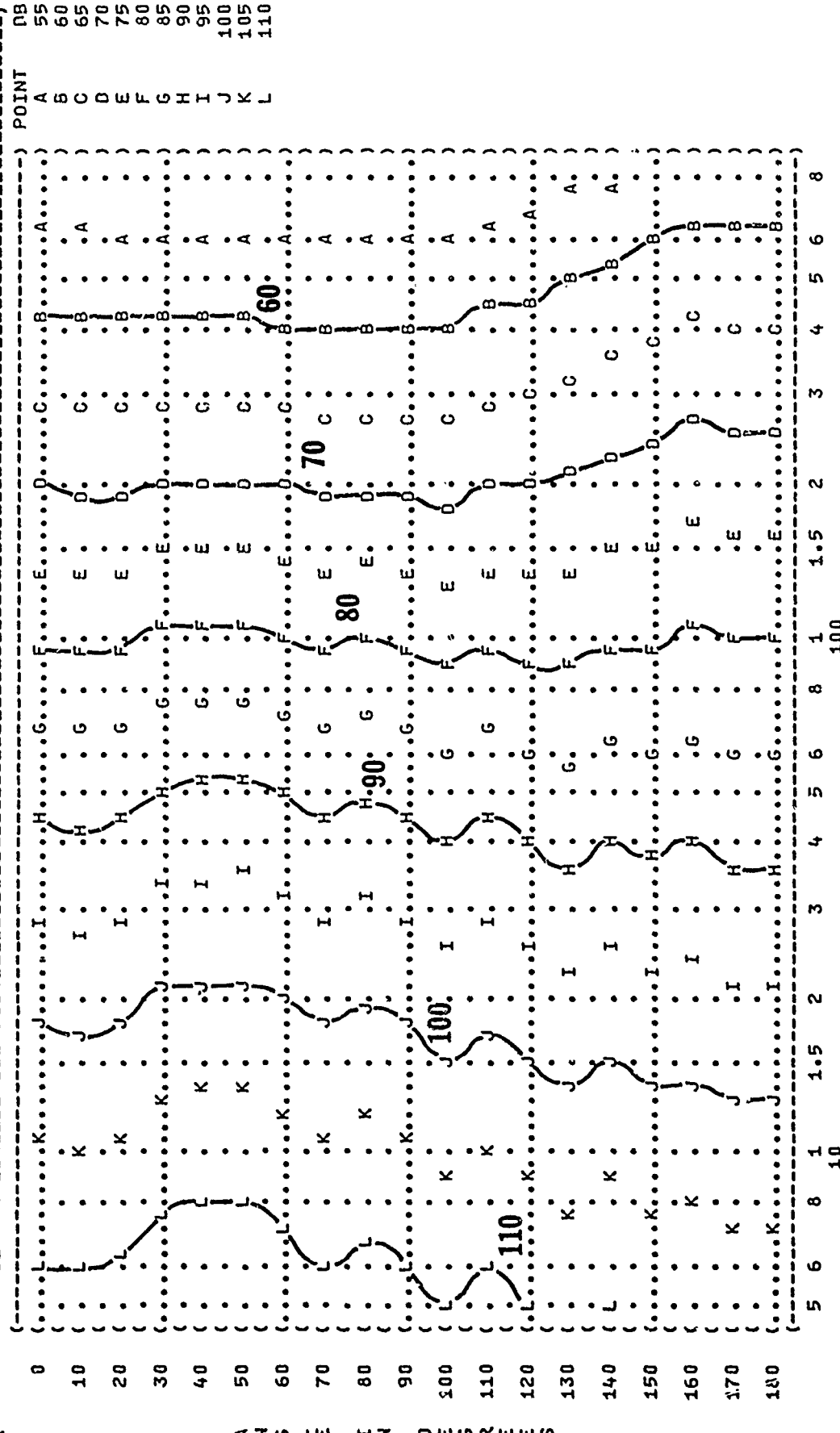
((FIGURE: NORMALIZED FARFIELD NOISE LEVELS
 ((2 DISTANCE = 10 METERS
 ((NOISE SOURCE/SUBJECT: (OPERATION:
 ((HA-1A POWER UNIT, GAS (42,500 RPM
 ((TURBINE ENGINE ((FAIRSEARCH)
 ((FAR FIELD NOISE LEVELS ((



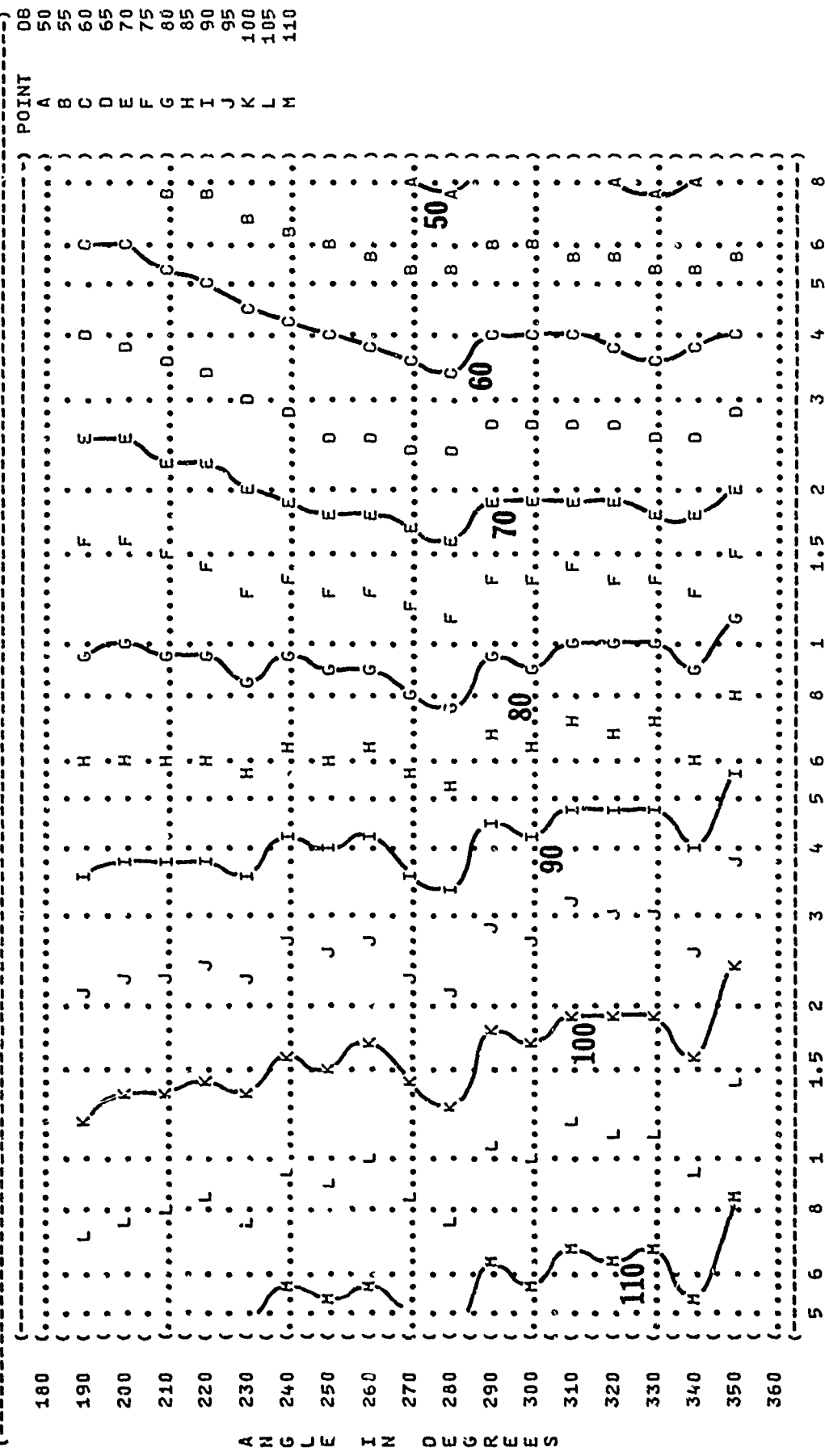
(FIGURE: NORMALIZED FARFIELD NOISE LEVELS
 (2 DISTANCE = 10 METERS
 (NOISE SOURCE/SUBJECT: MA-1A POWER UNIT, GAS
 (TURBINE ENGINE
 ((AIRSEARCH)
 (FAR FIELD NOISE LEVELS
 (1 = 31.5 HZ 2 = 63 HZ 3 = 125 HZ
 (4 = 250 HZ 5 = 500 HZ 6 = 1000 HZ
 (METEOROLOGY: TEMPERATURE = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (29 JAN 75
 (PAGE 4
 (IDENTIFICATION: OMEGA 1.3
 (TEST 71-020-270
 (RUN 02



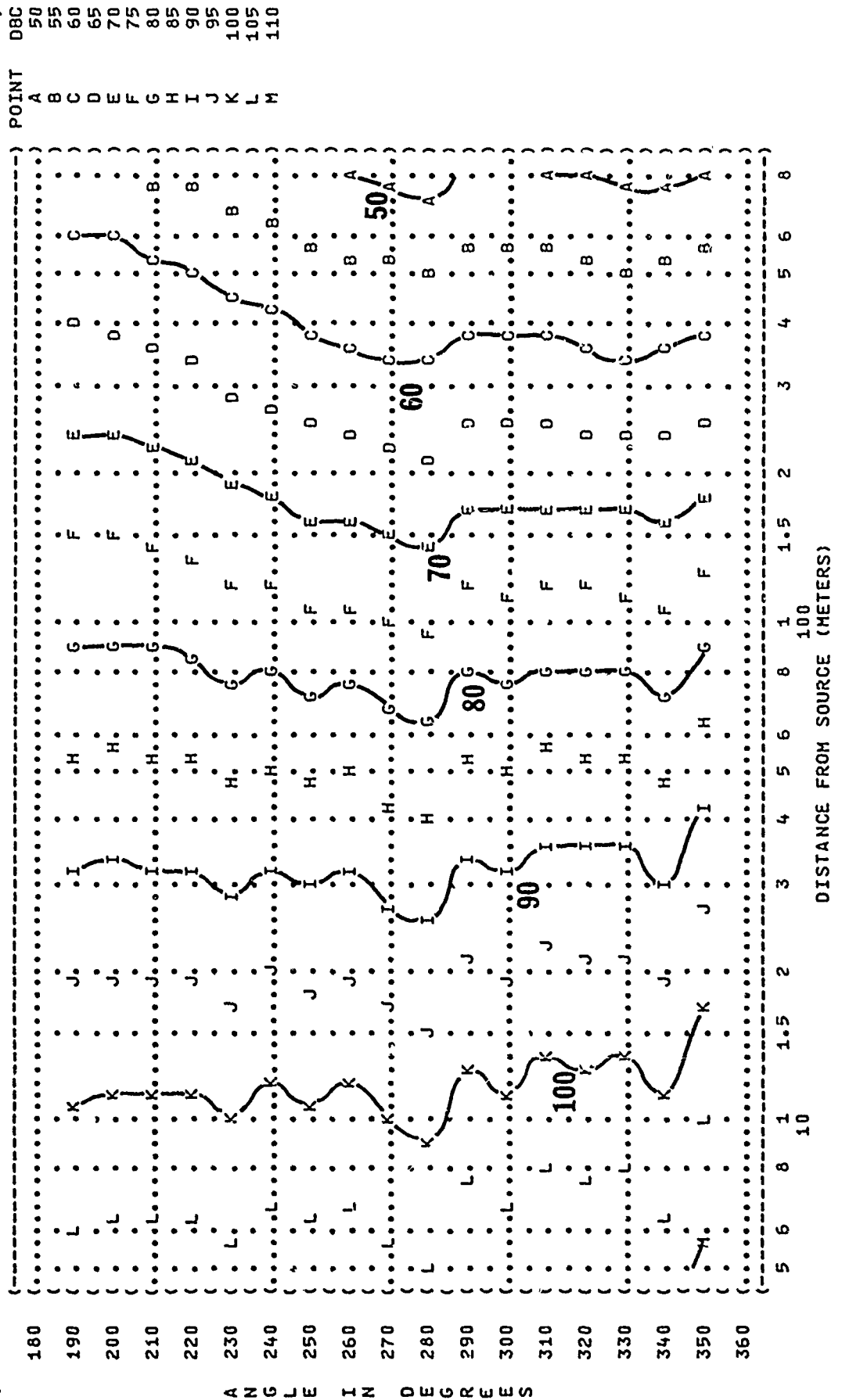
(FIGURE: OVERALL SOUND PRESSURE LEVEL (OASPL))
 (3)
 () IDENTIFICATION:)
 () OMEGA 1.3)
 () TEST 71-020-270)
 () RUN 01)
 () METEOROLOGY:)
 () TEMP = 15 C)
 () BAR PRESS = 760 M HG)
 () REL HUMID = 70 %)
 () 29 JAN 75)
 () PAGE 11)
 ()
 (NOISE SOURCE/SUBJECT:)
 () OPERATION:)
 () HA-1A POWER UNIT, GAS)
 () TURBINE ENGINE)
 () (AIRESEARCH))
 () FAR FIELD NOISE LEVELS)



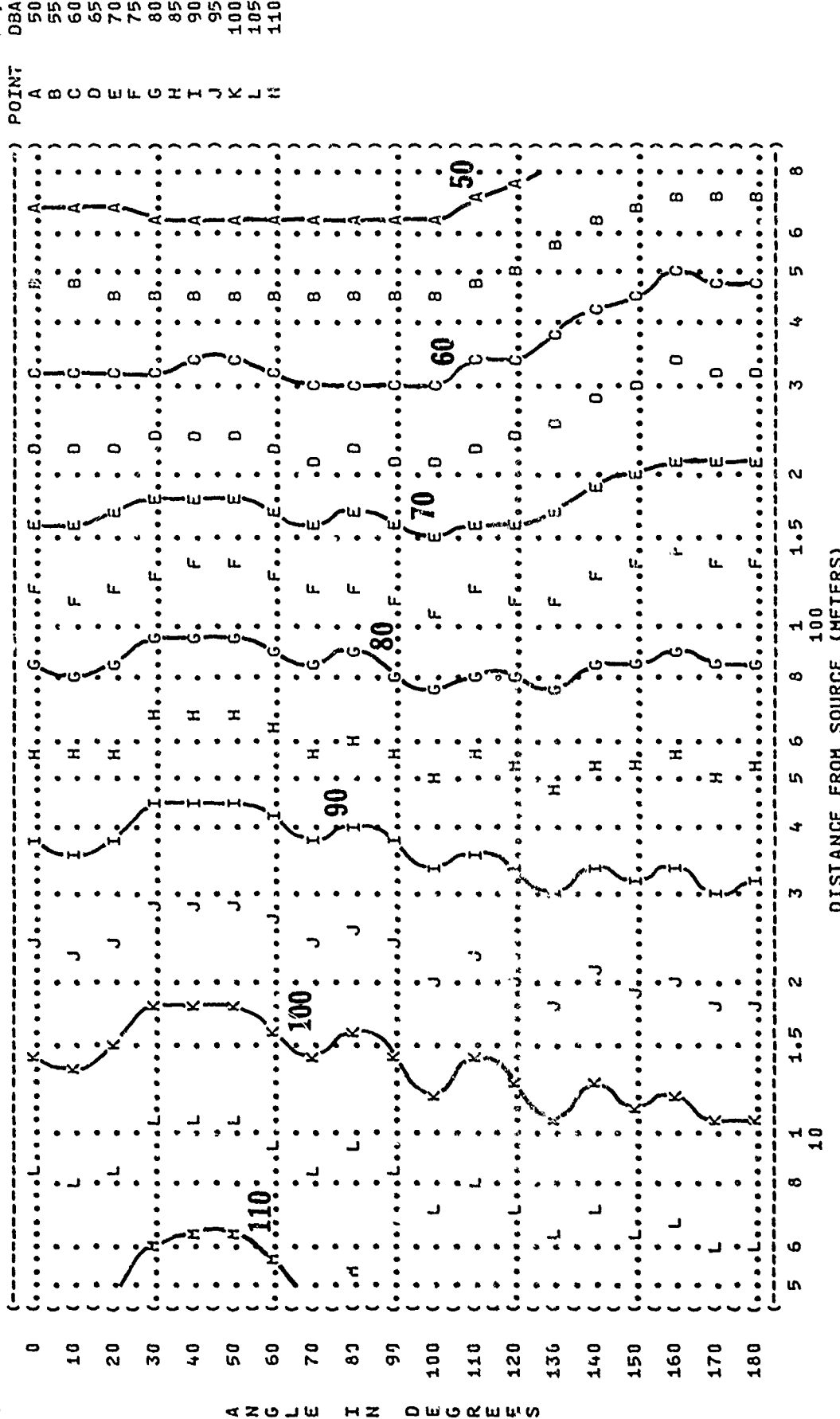
((FIGURE: OVERALL SOUND PRESSURE LEVEL (OASPL)
 ((3
 ((IDENTIFICATION:
 (() OMEGA 1.3
 (() TEST 71-020-270
 (() RUN 02
 (() METEOROLOGY:
 (() TEMP = 15 C
 (() BAR PRESS = .760 M HG
 (() REL HUMID = 70 %
 (() OPERATION:
 (() HA-1A POWER UNIT, GAS
 (() TURBINE ENGINE
 (() (AIRESEARCH)
 (() 42,500 RPM
 (() FAR FIELD NOISE LEVELS
 (() PAGE 11



(FIGURE: C-WEIGHTED OVERALL SOUND LEVEL (OASLC))
 (4 EQUAL LEVEL CONTOURS (OBC))
 () IDENTIFICATION:)
 () OMEGA 1.3)
 (TEST 71-020-270)
 (RUN 02)
 () METEOROLOGY:)
 () TEMP = 15 C)
 () BAR PRESS = .760 M HG)
 () REL HUMID = 70 %)
 () PAGE 12)
 () NOISE SOURCE/SUBJECT:)
 () OPERATION:)
 () HA-1A POWER UNIT, GAS)
 () TURBINE ENGINE)
 () (AIRESEARCH))
 () FAR FIELD NOISE LEVELS)



(FIGURE: A-WEIGHTED OVERALL SOUND LEVEL (OASLA)
 (5
 (EQUAL LEVEL CONTOURS (DBA)
 () IDENTIFICATION:
 () OMEGA 1.3
 () TEST 71-020-270
 () RUN 01
 () METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () 29 JAN 75
 () PAGE 13
 ()
 (NOISE SOURCE/SUBJECT:
 () OPERATION:
 () MA-1A POWER UNIT, GAS
 () TURBINE ENGINE
 () (AIRESEARCH)
 () FAR FIELD NOISE LEVELS
 ()



A N G L E I N D E G R E E S

**FIGURE: A-WEIGHTED OVERALL SOUND LEVEL {OASLA}
EQUAL LEVEL CONTOURS (DBA)**

OMEGA 1.3

TEOROLOGY: = 15 C
TEMP = .760 M HG
BAR PRESS = 70 %
REL HUMID

PAGE 13



(FIGURE: PERCEIVED NOISE LEVEL, TONE CORRECTED {PNLT}
 (6
 (EQUAL LEVEL CONTOURS (PNDB)
 () IDENTIFICATION:
 ()
 () OMEGA 1.3
 (TEST 71-020-270)
 (RUN 01)
 ()
 (NOISE SOURCE/SUBJECT:) METEOROLOGY:
 (HA-1A POWER UNIT, GAS) TEMP = 15 C
 (TURBINE ENGINE) BAR PRESS = .760 M HG
 ((AIRESEARCH)) REL HUMID = 70 %
 (FAR FIELD NOISE LEVELS)
 ()
 () PAGE 14
 ()

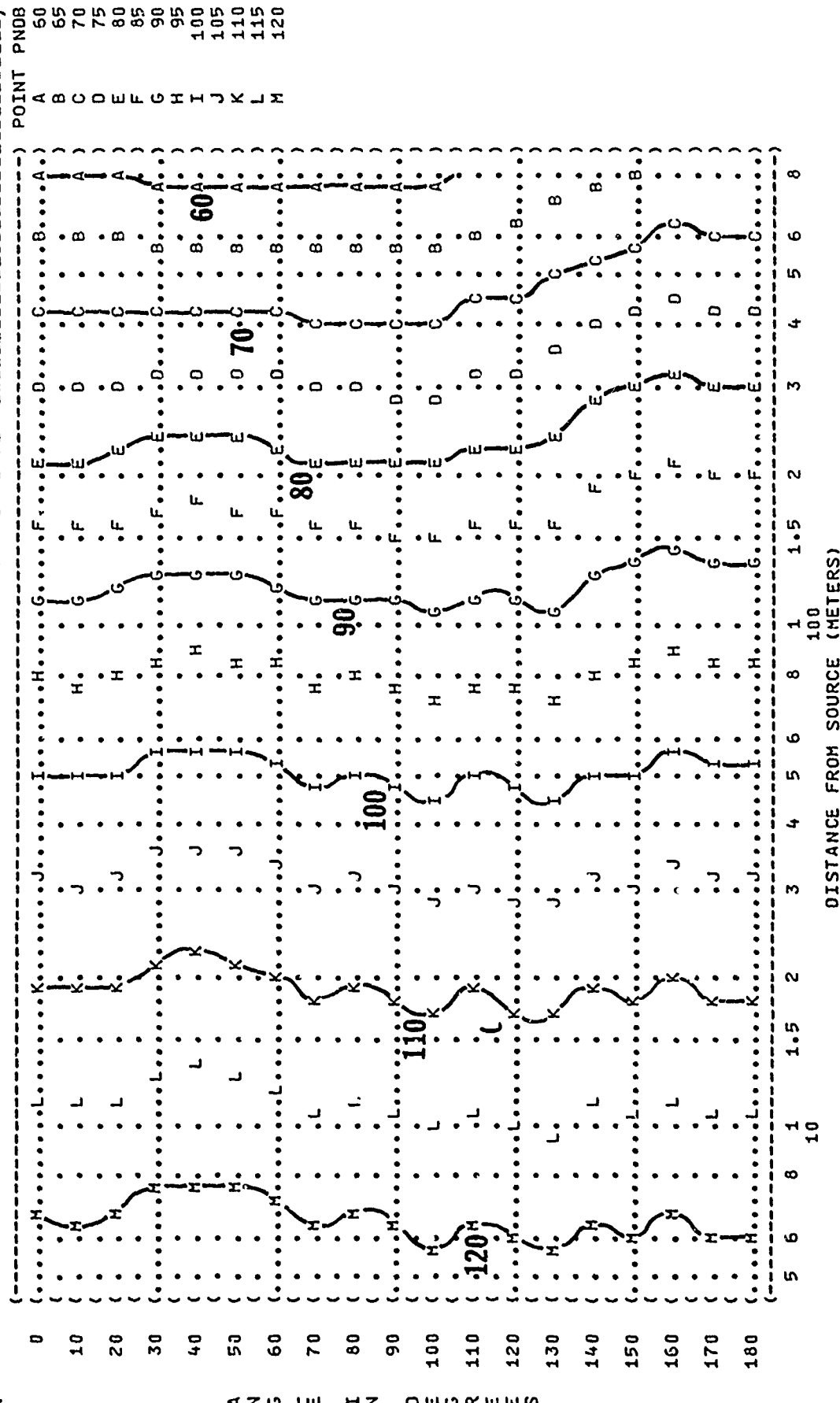
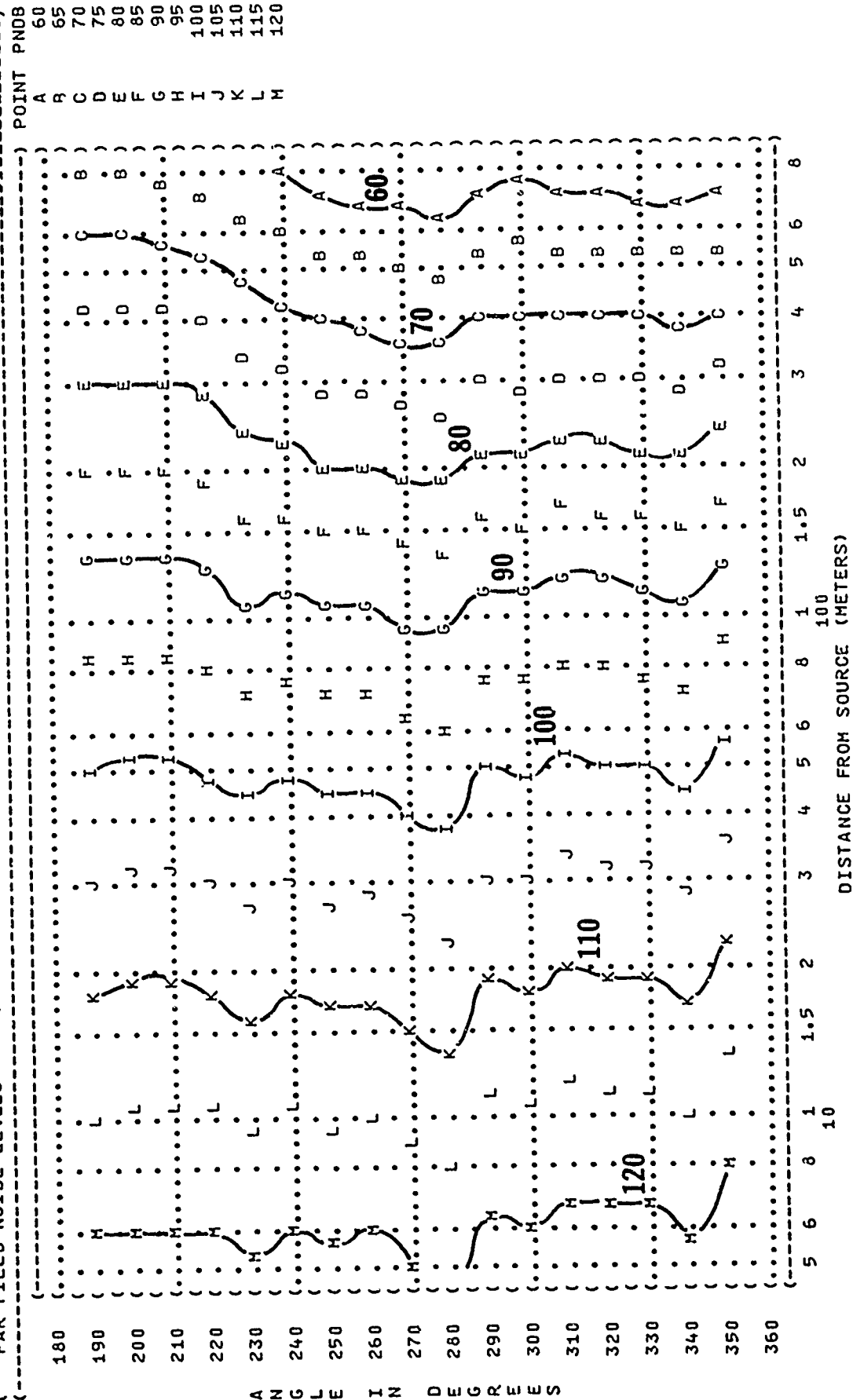
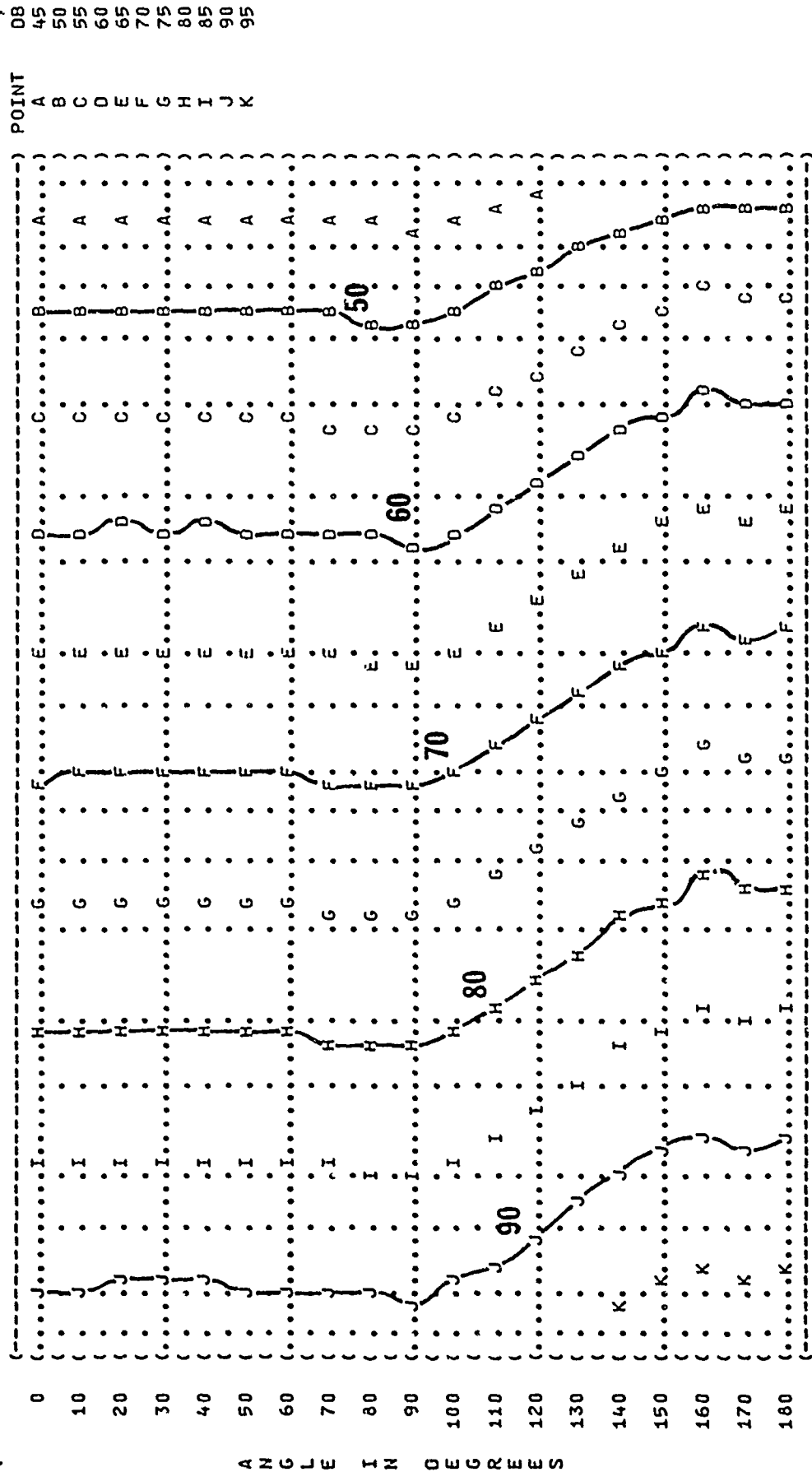


FIGURE: PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT)
 6
 EQUAL LEVEL CONTOURS (PNDB)

IDENTIFICATION:
 OMEGA 1.3
 TEST 71-020-270
 RUN 02
 METEOROLOGY:
 TEMP = 15 C
 BAR PRESS = .760 M HG
 REL HUMID = 70 %
 OPERATION:
 HA-1A POWER UNIT, GAS
 TURBINE ENGINE
 (AIRESEARCH)
 FAR FIELD NOISE LEVELS
 29 JAN 75
 PAGE 14

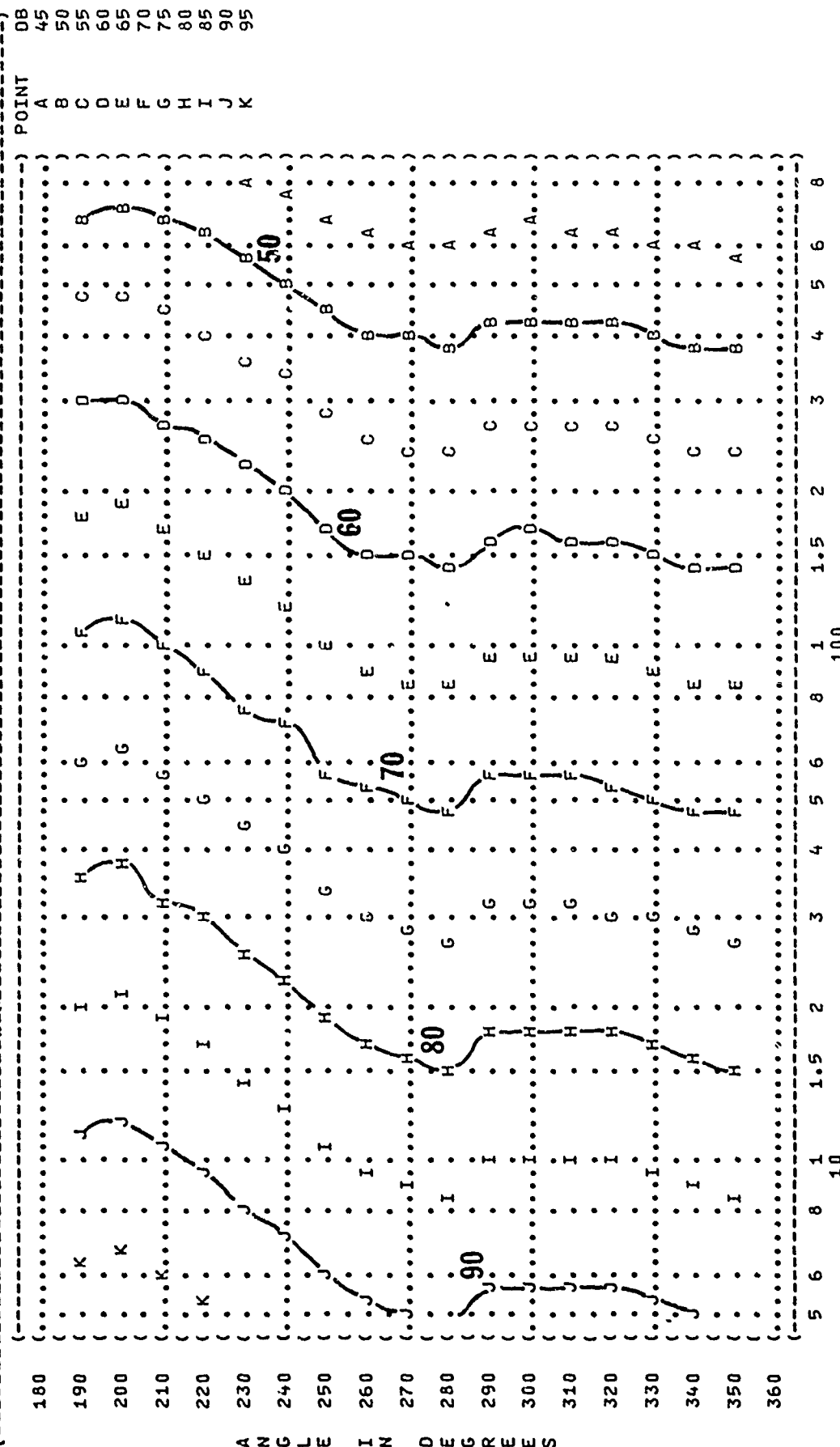


(FIGURE: PREFERRED SPEECH INTERFERENCE LEVEL (PSIL)
 (7
 (EQUAL LEVEL CONTOURS (DB)
 () IDENTIFICATION:
 () OMEGA 1.3
 () TEST 71-020-270
 () RUN 01
 () METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () PAGE 15
 ()



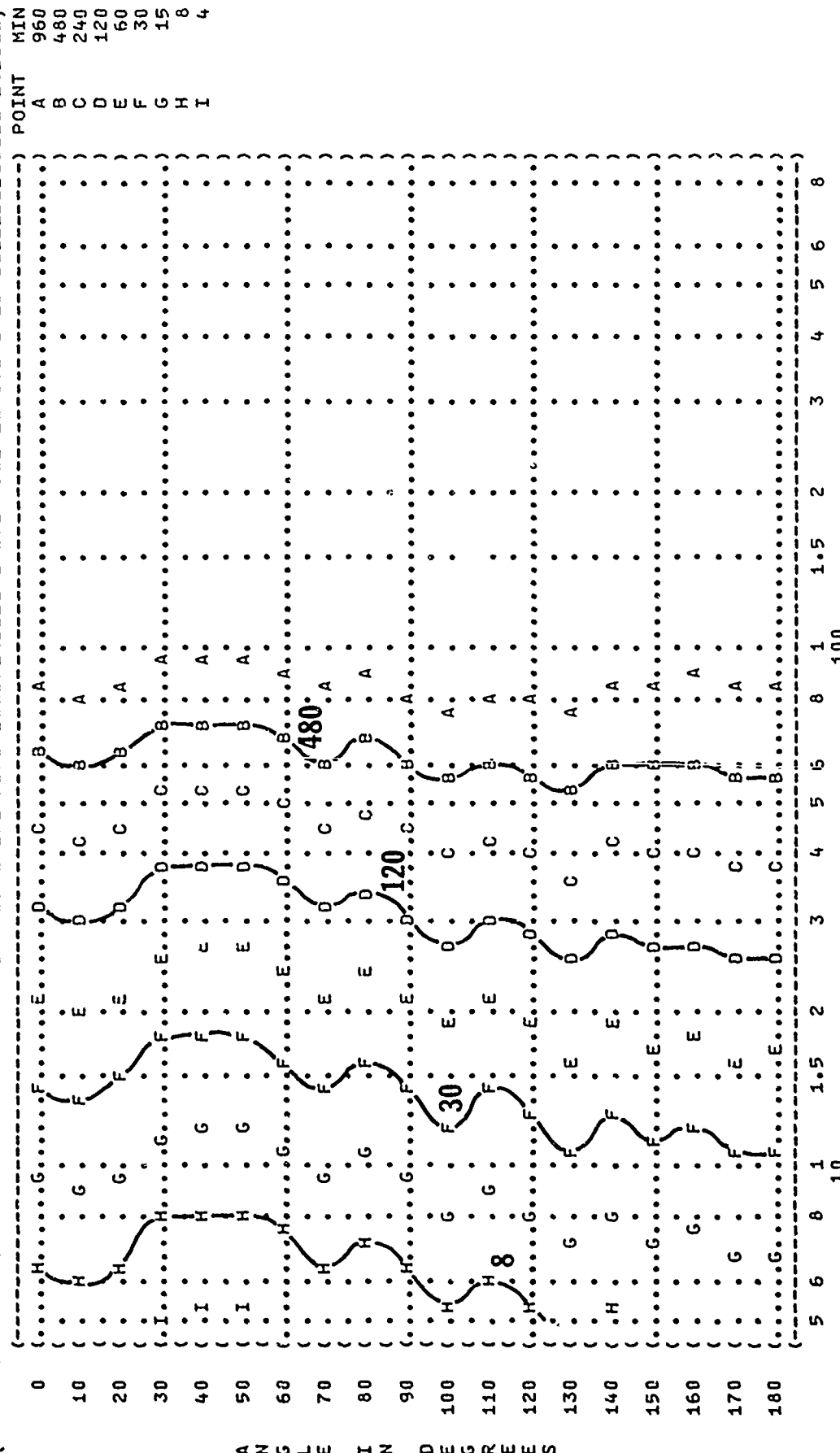
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
 A N G L E I N O E G R E E S
 5 6 8 1 10 1.5 2 3 4 5 6 8 100 1.5 2 3 4 5 6 8
 DISTANCE FROM SOURCE (METERS)

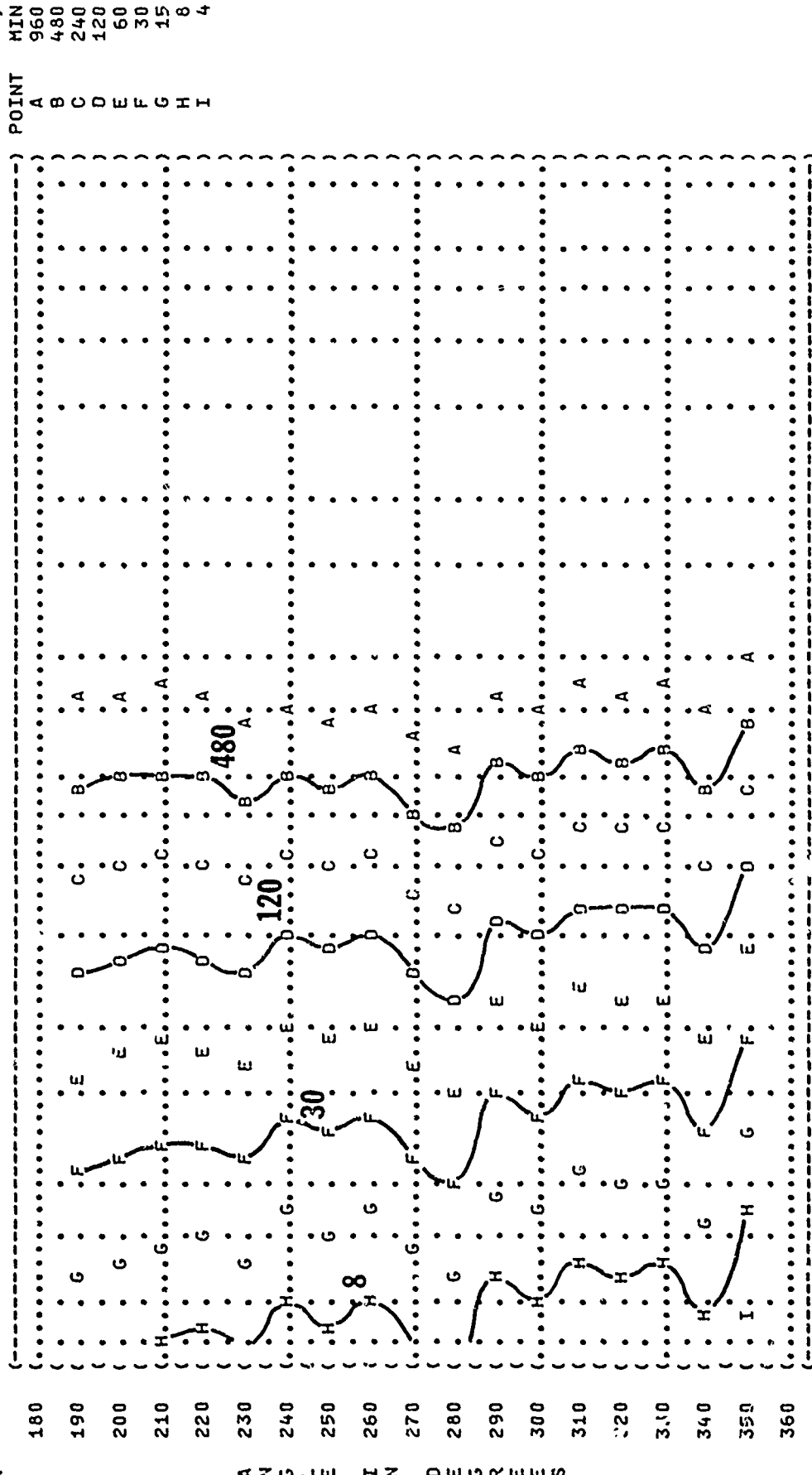
() FIGURE: PREFERRED SPEECH INTERFERENCE LEVEL (PSIL)
 () 7
 () IDENTIFICATION:
 () OMEGA 1.3
 () TEST 71-020-270
 () RUN 02
 () NOISE SOURCE/SUBJECT:
 () MA-1A POWER UNIT, GAS
 () TURBINE ENGINE
 () (AIRESEARCH)
 () FAR FIELD NOISE LEVELS
 () OPERATION:
 () 42,500 RPM
 () METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () PAGE 15



A N G L E I N D E G R E E S

(FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)) IDENTIFICATION:)
 (8 EQUAL TIME CONTOURS (MINUTES)))
 (NO PROTECTION))
 (NOISE SOURCE/SUBJECT: (OPERATION:) METEOROLOG:)
 (HA-1A POWER UNIT, GAS (42,500 RPM)) TEMP = 15 C)
 (TURBINE ENGINE ()) BAR PRESS = .760 M HG)
 ((AIRESEARCH) ()) REL HUMID = 70 %)
 (FAR FIELD NOISE LEVELS ()) PAGE 5)



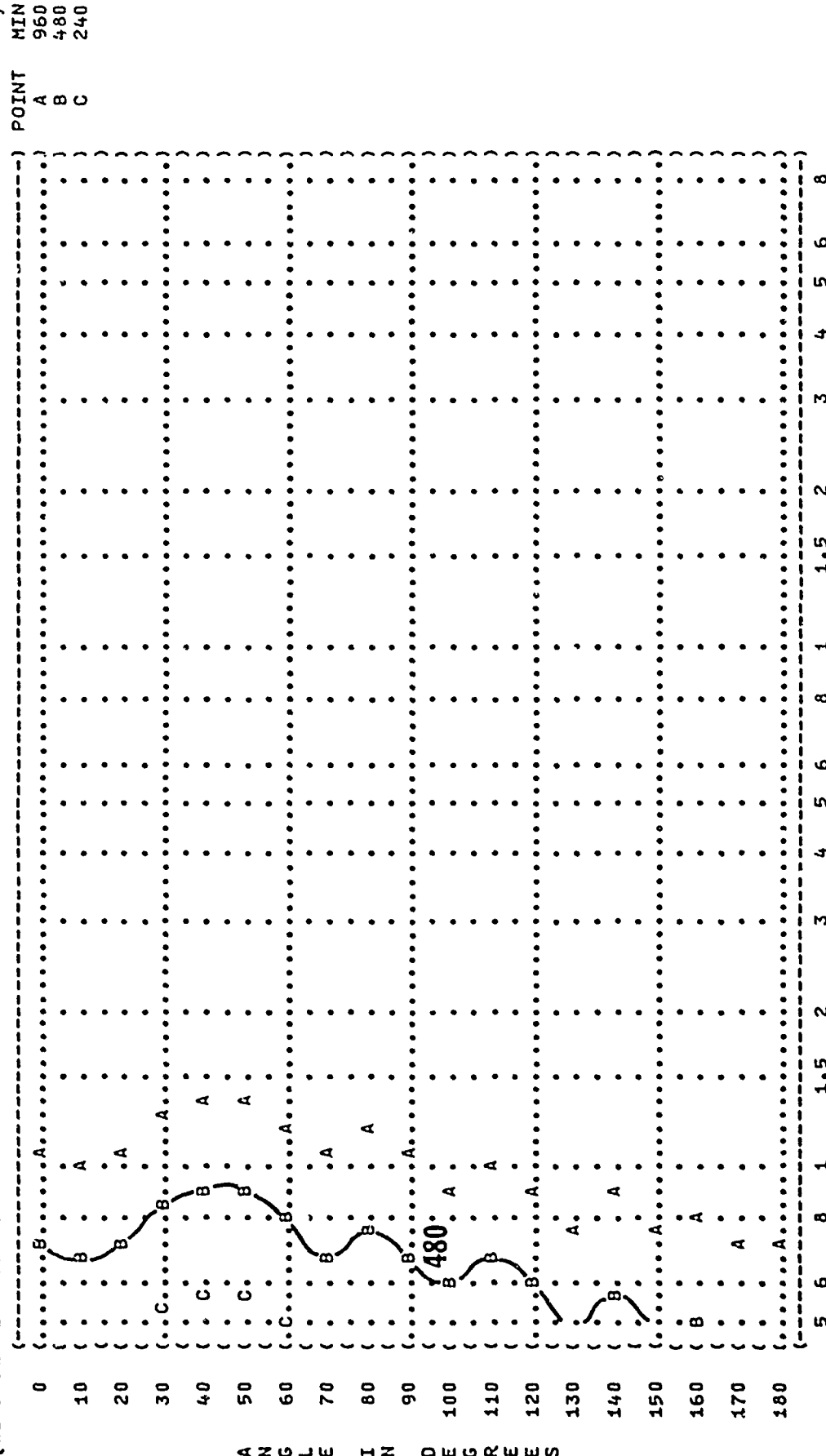
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DISTANCE FROM SOURCE (METERS)

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(-----)
( ( FIGURE: MAXIMUM PERMISSIBLE TIME {T} FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73) ) IDENTIFICATION: )
( ( 8 EQUAL TIME CONTOURS (MINUTES) ) )
( ( MINIMUM QPL EAR MUFFS ) )
(-----)
( ( NOISE SOURCE/SUBJECT: ) OPERATION: ) METEOROLOGY: )
( ( HA-1A POWER UNIT, GAS ) ) TEMP = 15 C )
( ( TURBINE ENGINE ) ) BAR PRESS = .760 M HG ) 29 JAN 75
( ( (AIRESEARCH) ) ) REL HUMID = 70 % )
( ( FAR FIELD NOISE LEVELS ) ) ) PAGE 6
(-----)

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DISTANCE FROM SOURCE (METERS)


```

(-----)
( FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73) ) IDENTIFICATION: )
( EQUAL TIME CONTOURS (MINUTES) ) )
( 8 AMERICAN OPTICAL 1700 EAR MUFFS ) OMEGA 1.3 )
(-----)
( NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( MA-1A POWER UNIT, GAS ) TEMP = 15 C )
( TURBINE ENGINE ) BAR PRESS = .760 M HG )
( (AIRESEARCH) ) REL HUMID = 70 % )
( FAR FIELD NOISE LEVELS ) ) PAGE 7 )
(-----)

```

[illegible]

DISTANCE FROM SOURCE (METERS)

FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)

8

EQUAL TIME CONTOURS (MINUTES)

AMERICAN OPTICAL 1700 EAR MUFFS

NOISE SOURCE/SUBJECT:

HA-1A POWER UNIT; GAS

TURBINE ENGINE

(AIRESEARCH)

FAR FIELD NOISE LEVELS

OPERATION:

42,500 RPM

METEOROLOGY:

TEMP = 15 C

BAR PRESS = .760 M HG

REL HUMID = 70 %

IDENTIFICATION:

OMEGA 1.3

TEST 71-020-270

RUN 02

29 JAN 75

PAGE 7

	DISTANCE FROM SOURCE (METERS)										POINT	MIN	
	5	6	8	1	1.5	2	3	4	5	6	8		
												A	960
												B	480
180													
190													
200													
210													
220													
230													
240													
250													
260													
270													
280													
290													
300													
310													
320													
330													
340													
350													
360													

A N G L E I N D E E G R E E S

FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)										IDENTIFICATION:	
8										OMEGA 1.3	
V-51R EAR PLUGS										TEST 71-020-270	
										RUN 02	
										29 JAN 75	
										PAGE 8	
NOISE SOURCE/SUBJECT:										METEOROLOGY:	
MA-1A POWER UNIT, GAS										TEMP = 15 C	
TURBINE ENGINE										BAR PRESS = .760 M HG	
(AIRESEARCH)										REL HUMID = 70 %	
FAR FIELD NOISE LEVELS											
										POINT	
										MIN	
										A B	
180											
190											
200											
210											
220											
230											
240											
250											
260											
270											
280											
290											
300											
310											
320											
330											
340											
350											
360											

DISTANCE FROM SOURCE (METERS)

100

10

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(-----)
( FIGURE: MAXIMUM PERMISSIBLE TIME {} FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73) ) IDENTIFICATION: )
( ( EQUAL TIME CONTOURS (MINUTES) ) )
( 8 CONFIT TRIPLE FLANGE EAR PLUGS ) OMEGA 1.3
(-----)
( NOISE SOURCE/SUBJECT: ( OPERATION: ) METEOROLOGY: )
( ( HA-1A POWER UNIT, GAS ( ) TEMP = 15 C ) )
( ( TURBINE ENGINE ( 42,500 RPM ) ) BAR PRESS = .760 M HG ) 29 JAN 75
( ( (AIRESEARCH) ( ) REL HUMID = 70 % ) )
( ( FAR FIELD NOISE LEVELS ( ) ) ) PAGE 9
(-----)

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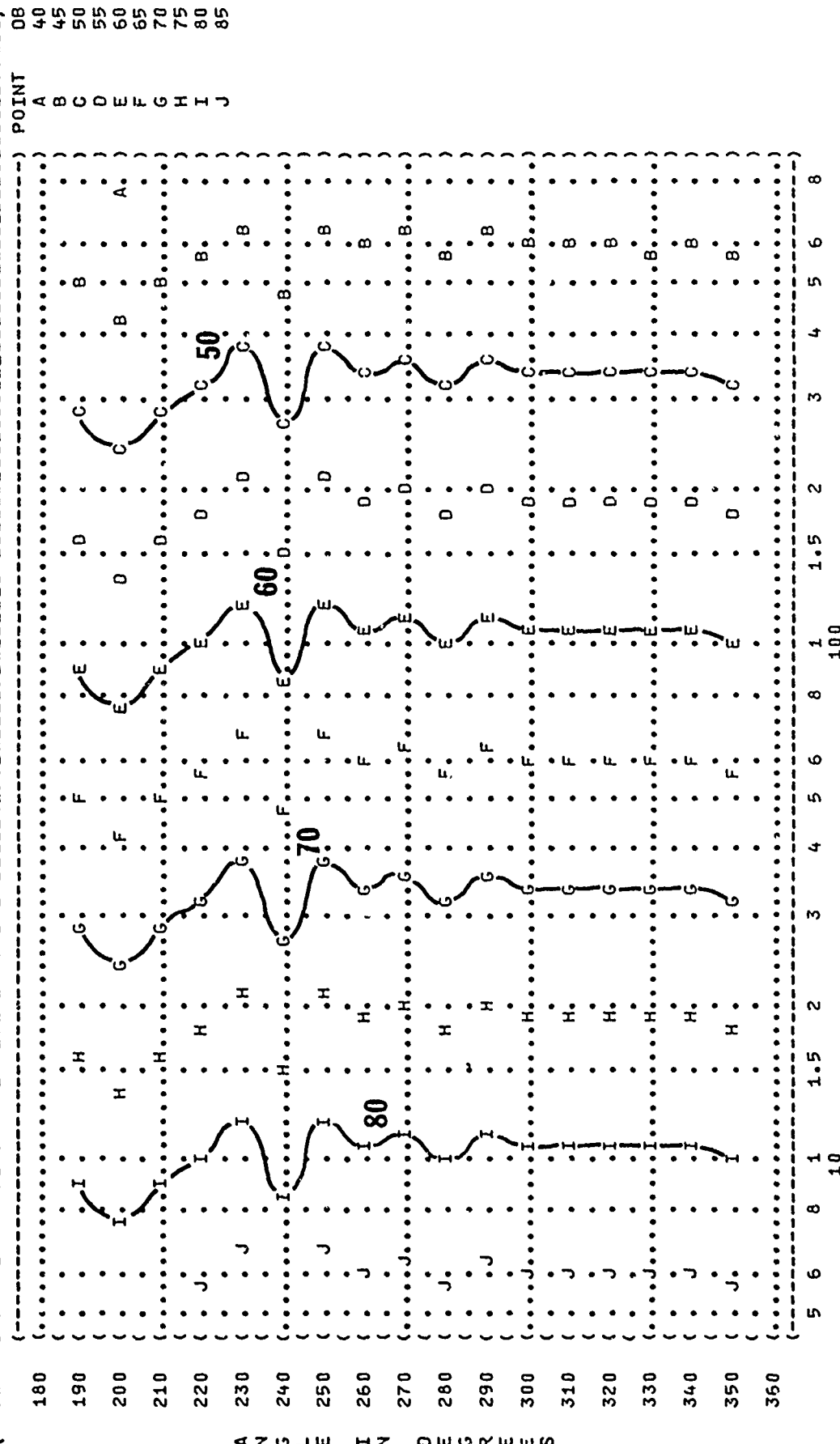
DISTANCE FROM SOURCE (METERS)

POINT MIN
A 960

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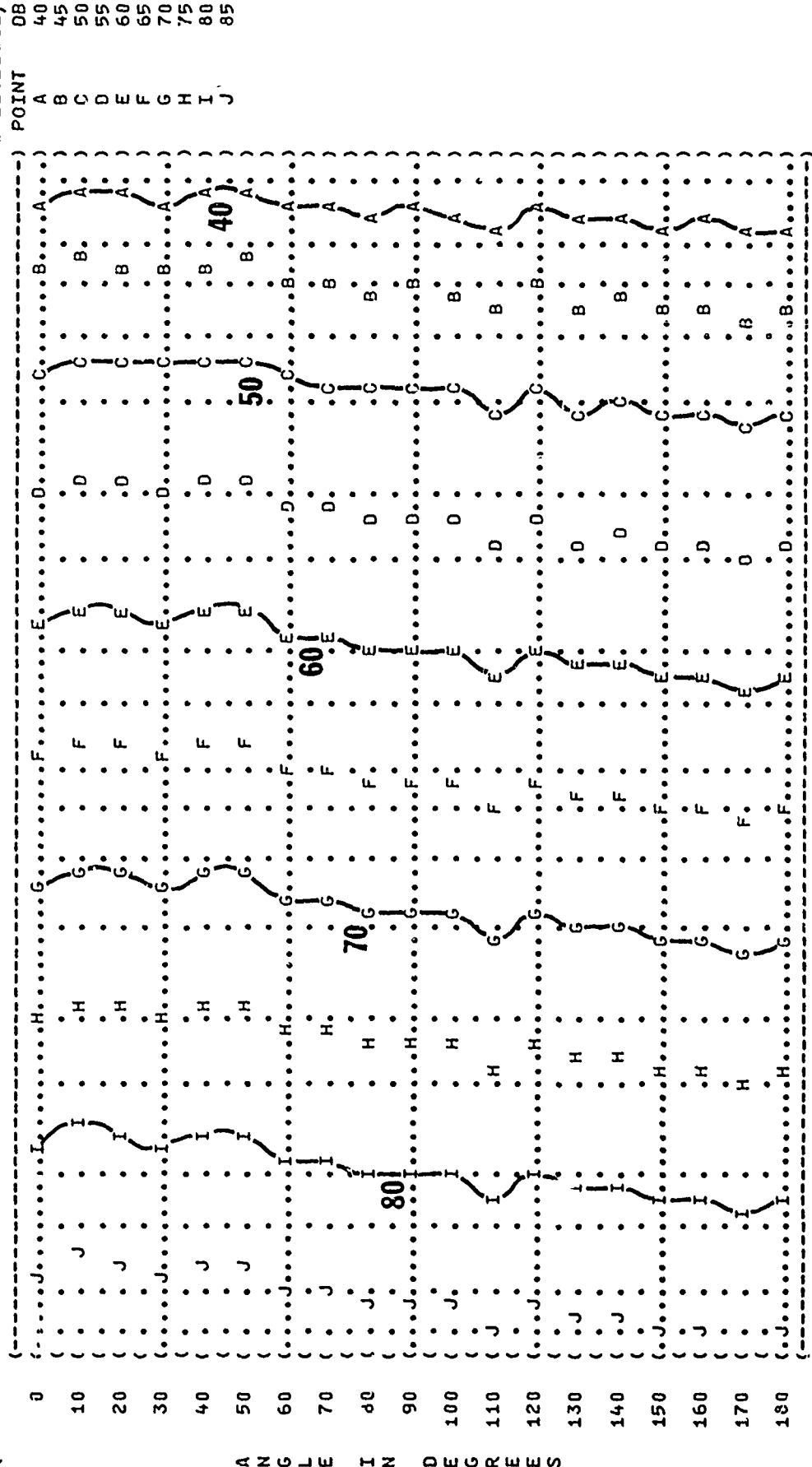
DISTANCE FROM SOURCE (METERS)


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(-----)
( FIGURE: SOUND PRESSURE LEVEL {SPL} ) IDENTIFICATION: )
( EQUAL LEVEL CONTOURS (DB) ) )
( 9 ) OMEGA 1.3 )
( 31.5 HZ OCTAVE BAND ) TEST 71-020-270 )
(-----)
( NOISE SOURCE/SUBJECT' ) METEOROLOGY: )
( HA-1A POWER UNIT, GAS ) TEMP = 15 C )
( TURBINE ENGINE ) BAR PRESS = .760 M HG )
( (AIRESEARCH) ) REL HUMID = 70 % )
( FAR FIELD NOISE LEVELS ) PAGE 16 )
(-----)
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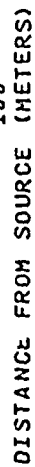


420 JW HZ 050455

(FIGURE: SOUND PRESSURE LEVEL {SPL}
 (9 EQUAL LEVEL CONTOURS (DB)
 (63 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (HA-1A POWER UNIT, GAS (42,500 RPM
 (TURBINE ENGINE (BAR PRESS = .760 M HG
 ((AIRESEARCH) (REL HUMID = 70 %
 (FAR FIELD NOISE LEVELS ()
 () METEOROLOGY:
 () TEMP = 15 C
 () RUN 01
 () TEST 71-020-270
 () OMEGA 1.3
 () IDENTIFICATION:
 () PAGE 17



DISTANCE FROM SOURCE (METERS)

[illegible]

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(-----)
( ) FIGURE: SOUND PRESSURE LEVEL (SPL) ) IDENTIFICATION: )
( ) EQUAL LEVEL CONTOURS (DB) )
( ) 9 ) OMEGA 1.3 )
( ) 125 HZ OCTAVE BAND ) TEST 71-020-270 )
(-----)
( ) NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( ) HA-1A POWER UNIT, GAS ) TEMP = 15 C )
( ) TURBINE ENGINE ) BAR PRESS = .760 M HG )
( ) (AIRESEARCH) ) REL HUMID = 70 % )
( ) FAR FIELD NOISE LEVELS ) PAGE 18 )
(-----)
```

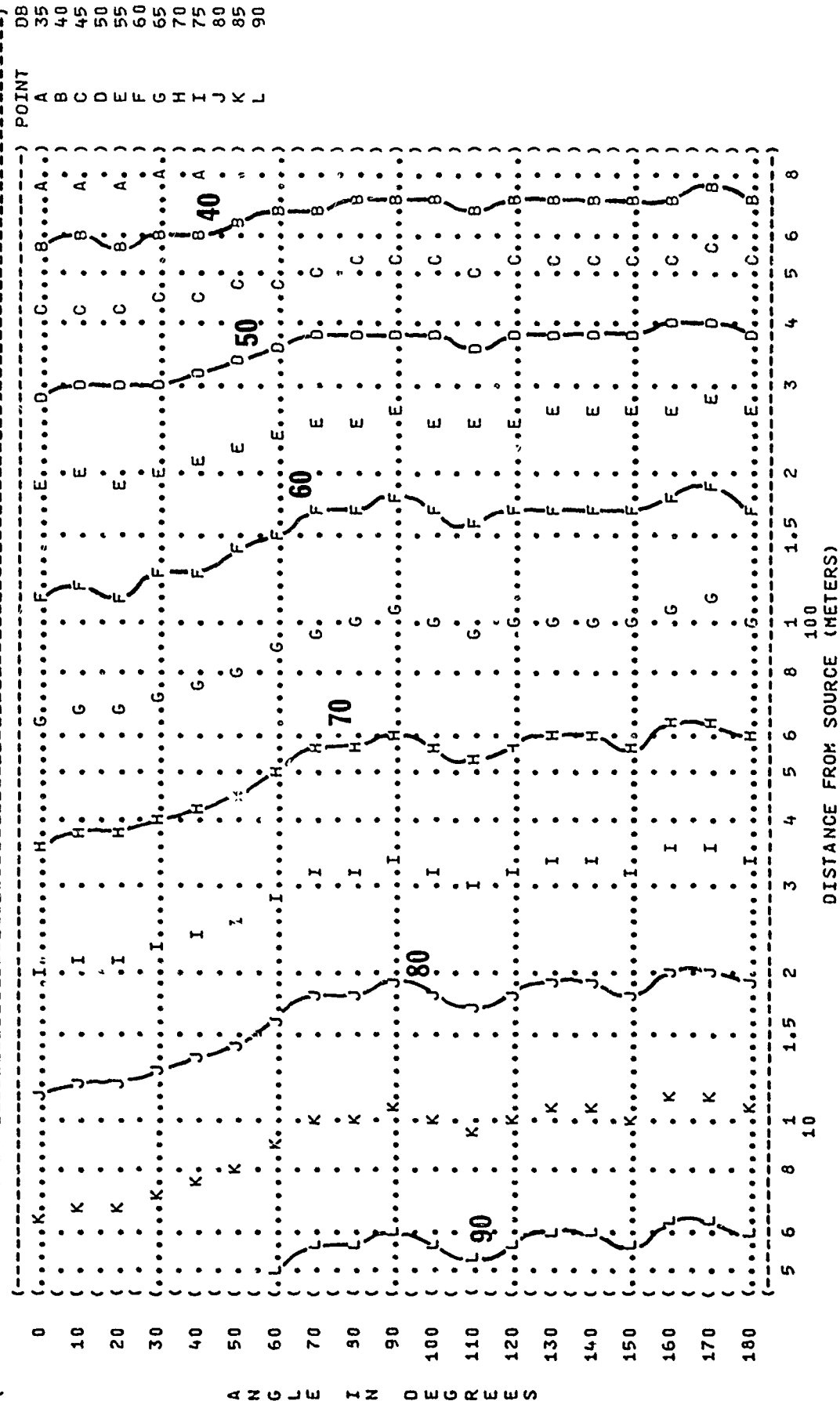
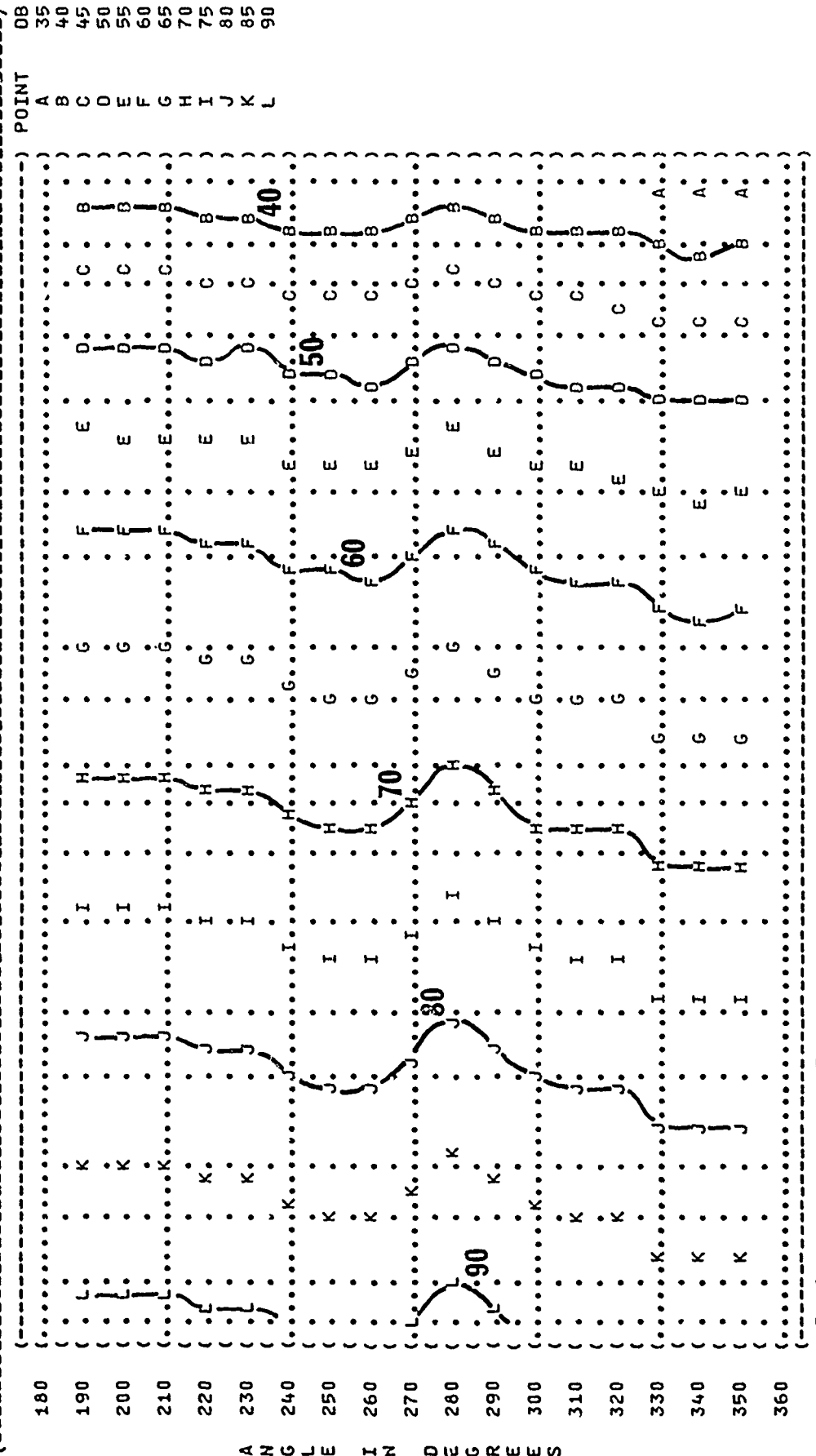


FIGURE: SOUND PRESSURE LEVEL (SPL)
 9 EQUAL LEVEL CONTOURS (DB)
 125 HZ OCTAVE BAND
 NOISE SOURCE/SUBJECT: (OPERATION:
 MA-1A POWER UNIT, GAS (TEMP = 15 C
 TURBINE ENGINE (BAR PRESS = .760 M HG
 (AIRESEARCH) (REL HUMID = 70 %
 FAR FIELD NOISE LEVELS (PAGE 18



A N G L E I N D E G R E E S

FIGURE: SOUND PRESSURE LEVEL {SPL}
EQUAL LEVEL CONTOURS (DB)
9
250 HZ OCTAVE BAND

```
IDENTIFICATION:
OMEGA 1.3
TEST 71-020-270
RUN 01
29 JAN 75
PAGE 19
```

► METEOROLOGY:

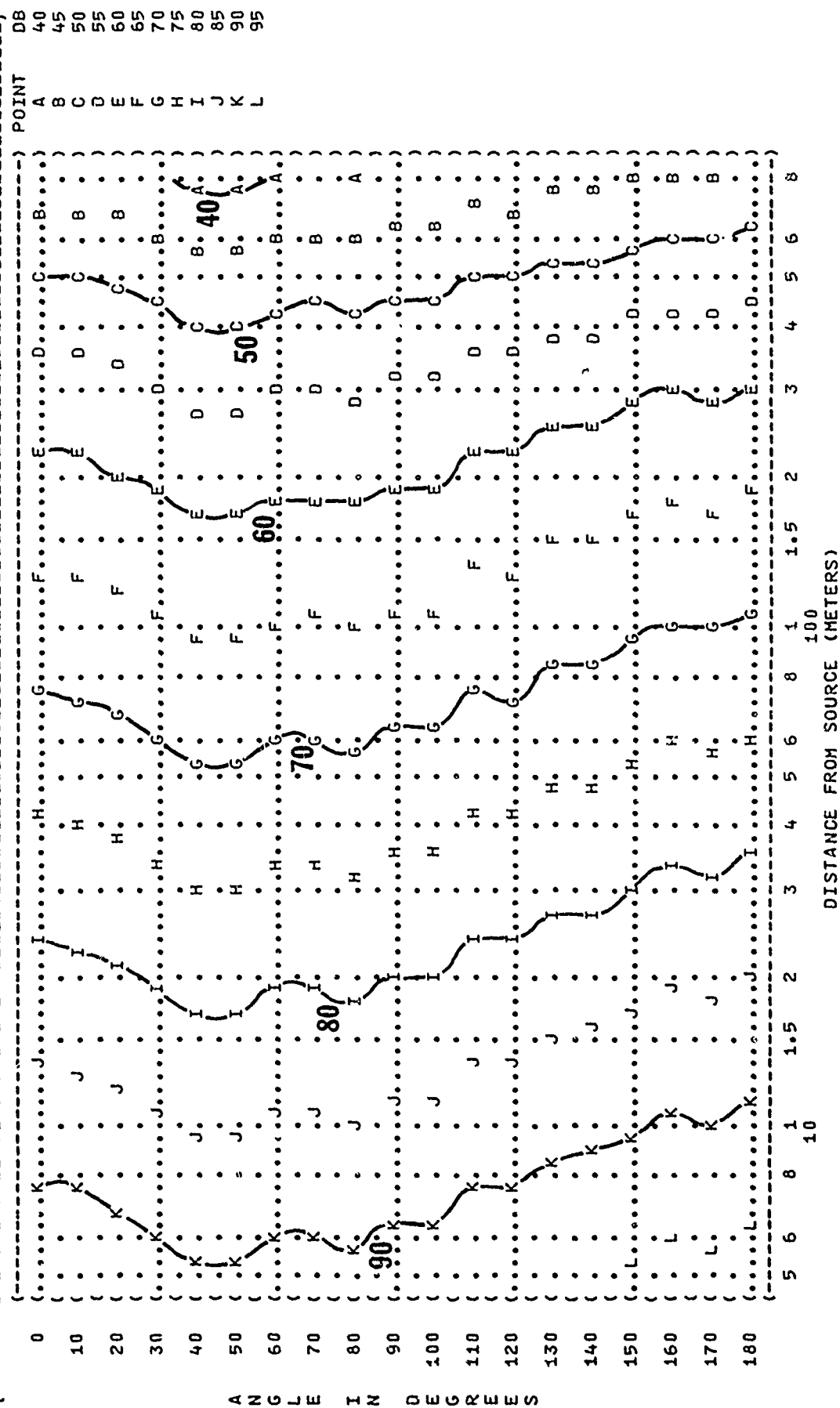
TEMP = 15 C
BAR PRESS = .760 M HG
REL HUMID = 70 %

OPERATION:

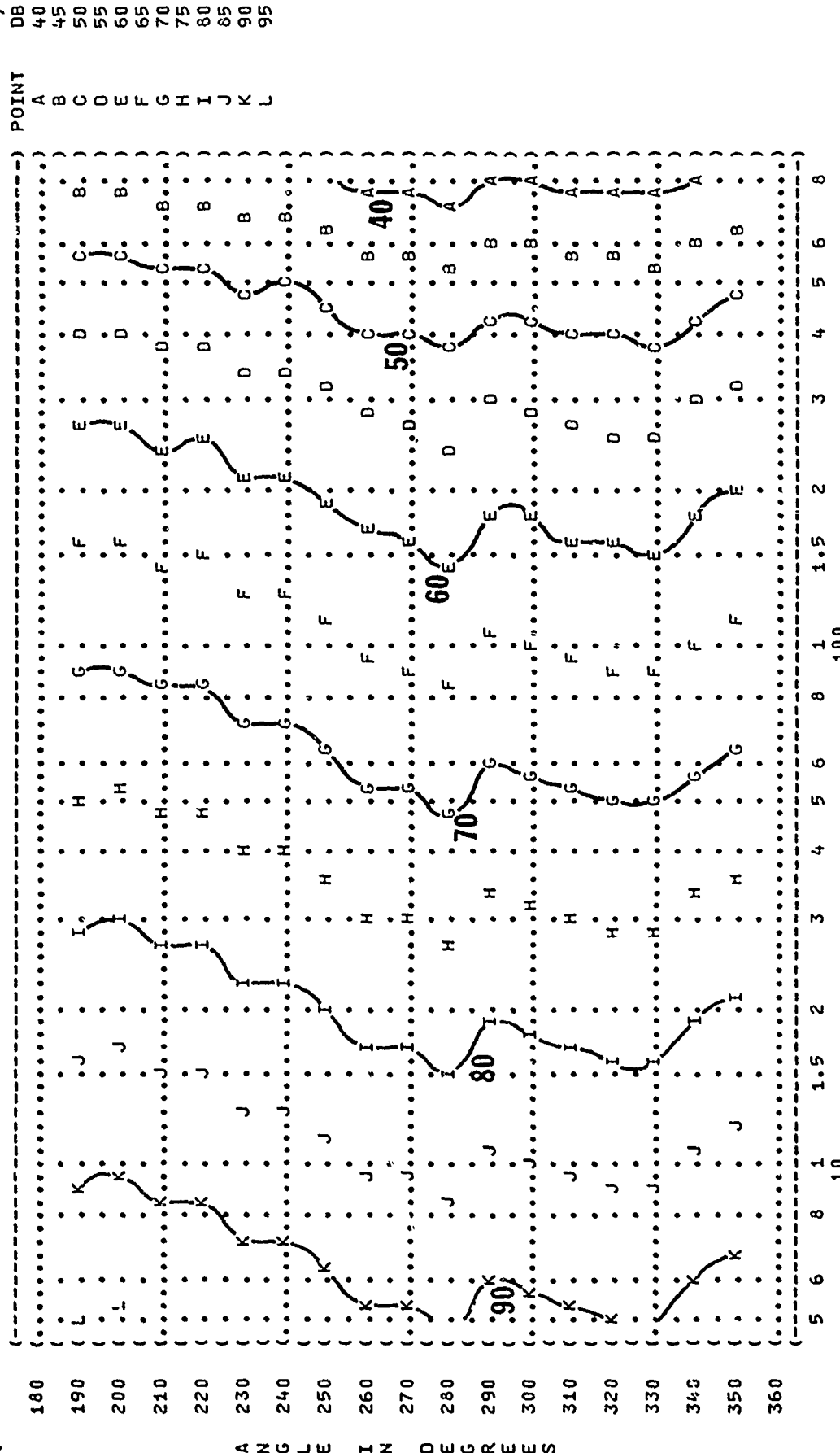
42,500 RPM

ISE SOURCE/SUBJECT:

MA-1A POWER UNIT, GAS
TURBINE ENGINE
(AIRESEARCH)

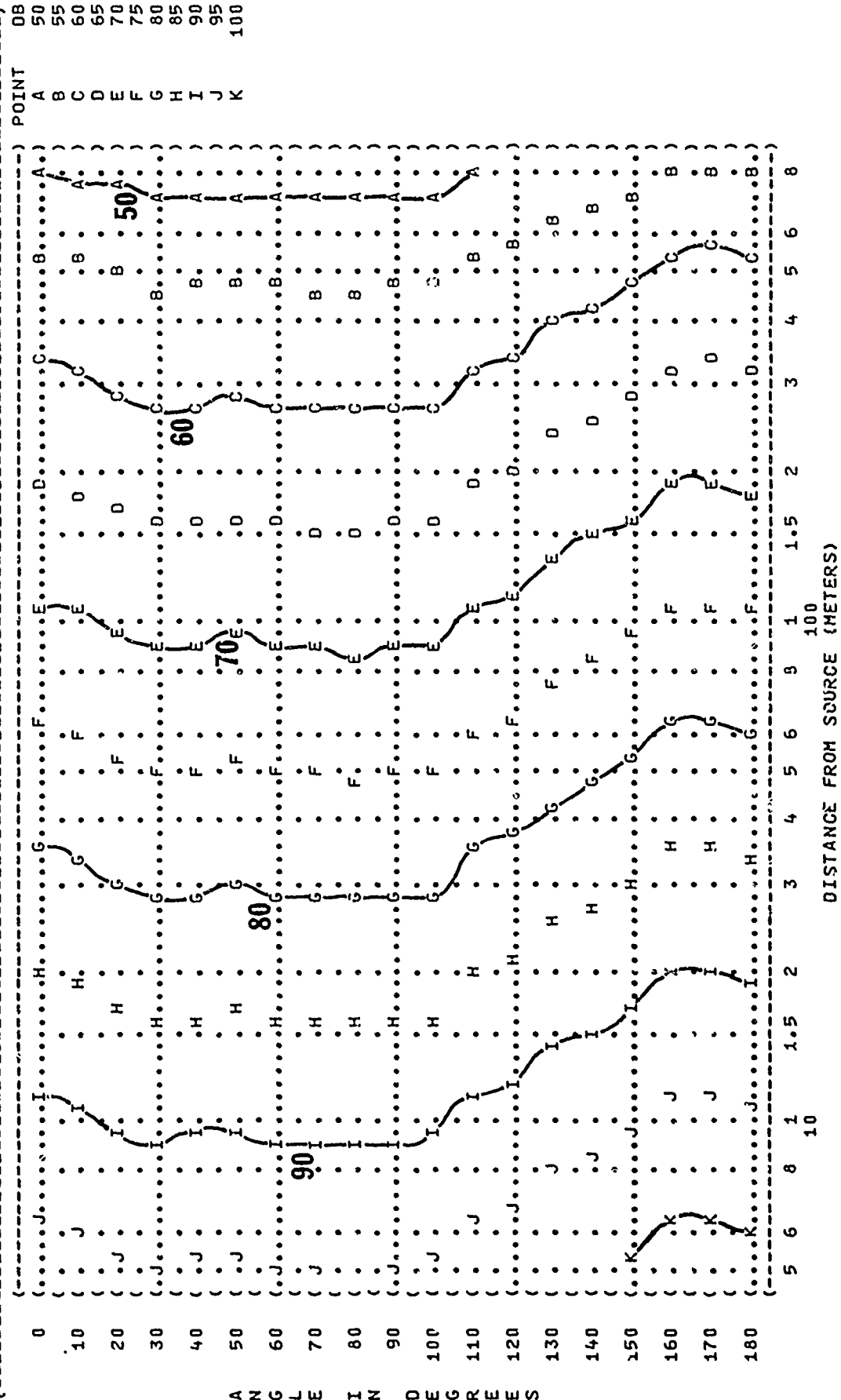


() FIGURE: SOUND PRESSURE LEVEL (SPL)
 () EQUAL LEVEL CONTOURS (DB)
 () 9 250 HZ OCTAVE BAND
 () NOISE SOURCE/SUBJECT:
 () HA-1A POWER UNIT, GAS
 () TURBINE ENGINE
 () (AIRESEARCH)
 () FAR FIELD NOISE LEVELS
 () OPERATION:
 () 42,500 RPM
 () METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () IDENTIFICATION:
 () OMEGA 1.3
 () TEST 71-020-270
 () RUN 02
 () 29 JAN 75
 () PAGE 19

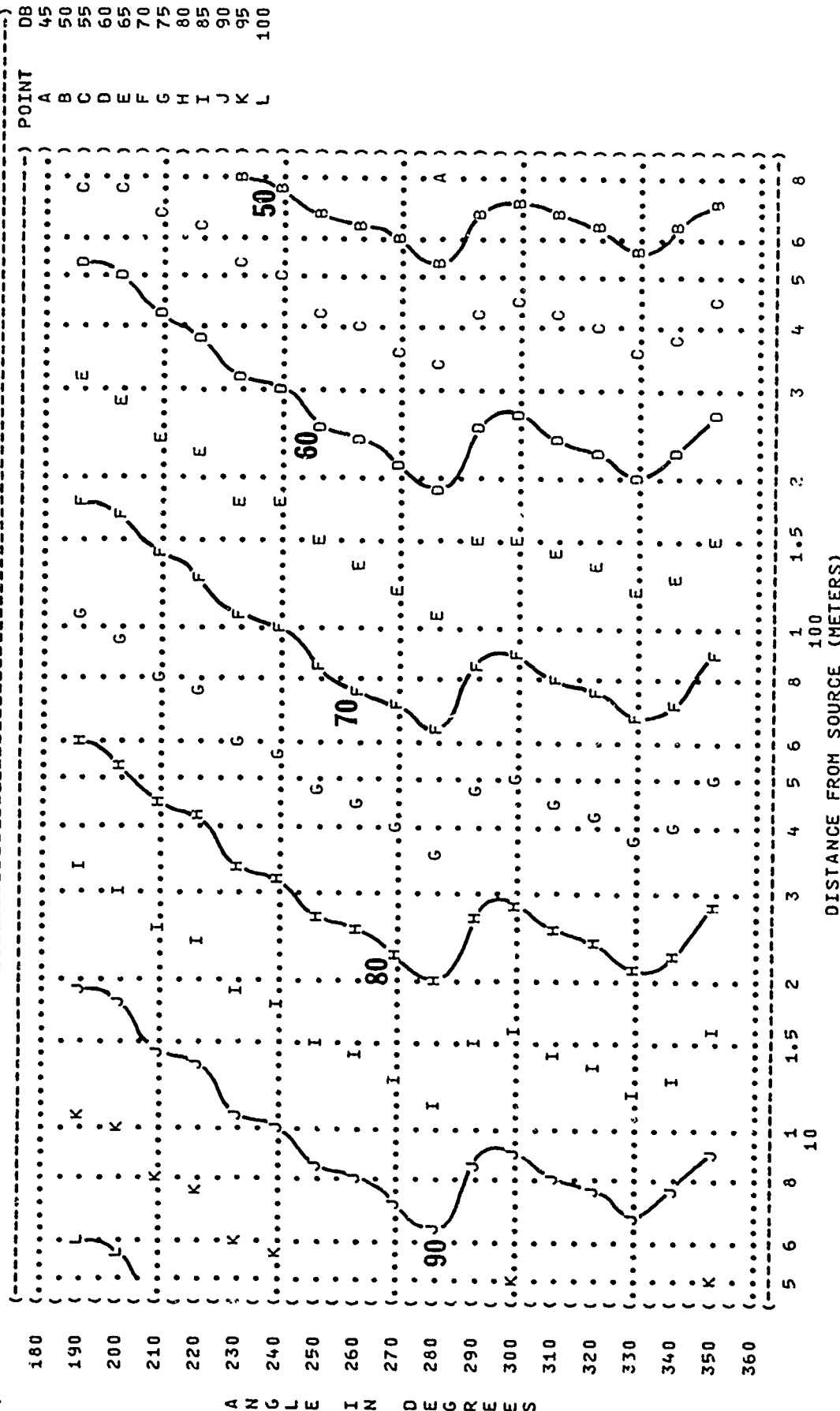


A N G L E I N D E G R E E S

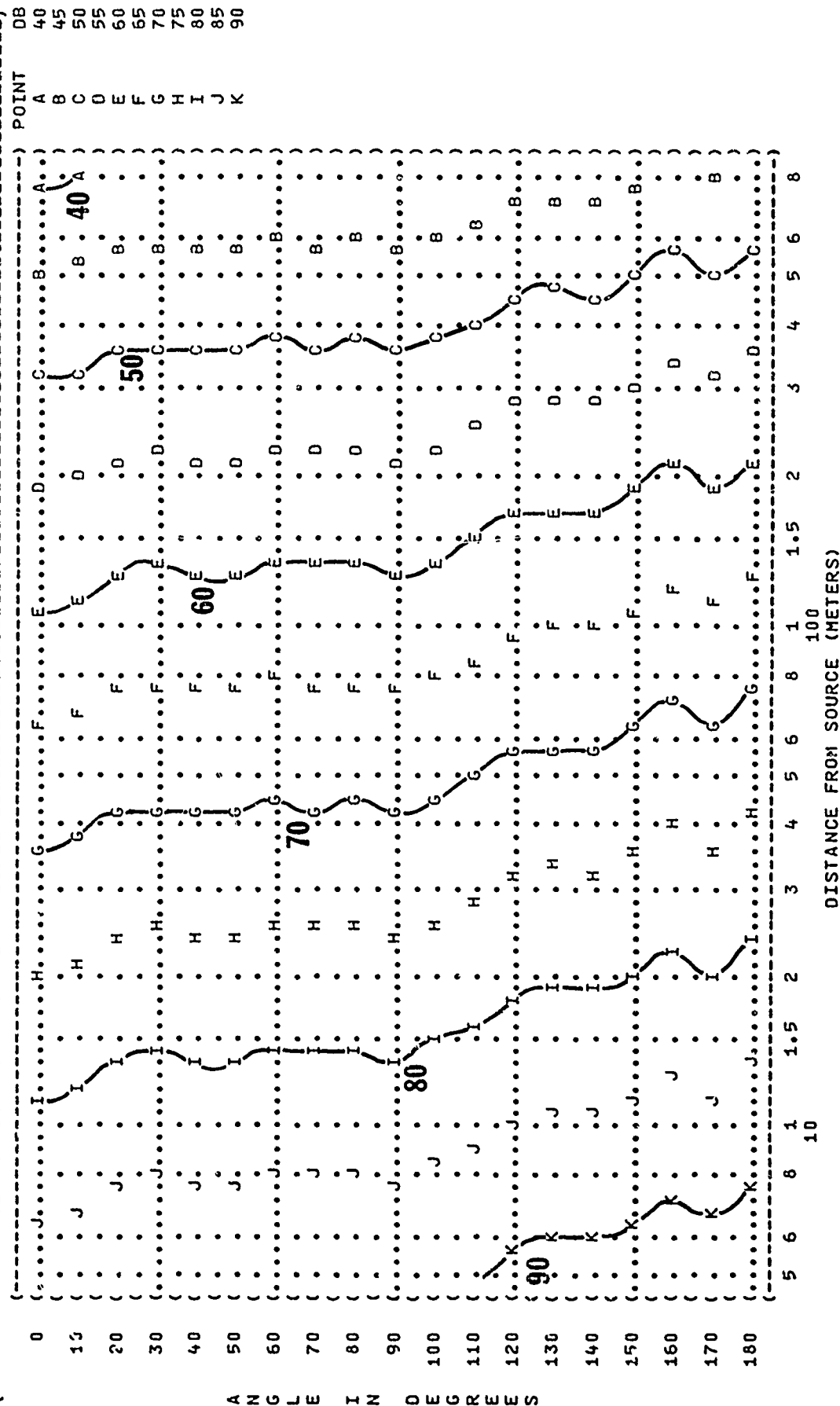
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(-----)
( FIGURE: SOUND PRESSURE LEVEL {SPL} ) IDENTIFICATION: )
( EQUAL LEVEL CONTOURS (DB) ) )
( 9 ) OMEGA 1.3 )
( 500 HZ OCTAVE BAND ) TEST 71-020-270 )
(-----)
( NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( MA-1A POWER UNIT, GAS ) TEMP = 15 C )
( TURBINE ENGINE ) BAR PRESS = .760 M HG )
( (AIRESARCH) ) REL HUMID = 70 % )
( FAR FIELD NOISE LEVELS ) PAGE 20 )
(-----)
```



(FIGURE: SOUND PRESSURE LEVEL (SPL))
 (9 EQUAL LEVEL CONTOURS (DB))
 (500 HZ OCTAVE BAND)
 (NOISE SOURCE/SUBJECT:)
 (HA-1A POWER UNIT, GAS)
 (TURBINE ENGINE)
 ((AIRESEARCH))
 (FAR FIELD NOISE LEVELS)
 (OPERATION:)
 (42,500 RPM)
 (METEOROLOGY:)
 (TEMP = 15 C)
 (BAR PRESS = .760 M HG)
 (REL HUMID = 70 %)
 (IDENTIFICATION:)
 (OMEGA 1.3)
 (TEST 71-020-270)
 (RUN 02)
 (29 JAN 75)
 (PAGE 20)



```
(-----)
( FIGURE: SOUND PRESSURE LEVEL {SPL} ) IDENTIFICATION: )
(    9   EQUAL LEVEL CONTOURS (DB) ) )
(      1000 HZ OCTAVE BAND ) OMEGA 1.3 )
(-----) TEST 71-020-270 )
( NOISE SOURCE/SUBJECT: ) RUN 01 )
( MA-1A POWER UNIT, GAS ) TEMP = 15 C )
( TURBINE ENGINE ) BAR PRESS = .760 M HG )
( (AIRESEARCH) ) REL HUMID = 70 % )
( FAR FIELD NOISE LEVELS ) PAGE 21 )
(-----)
```



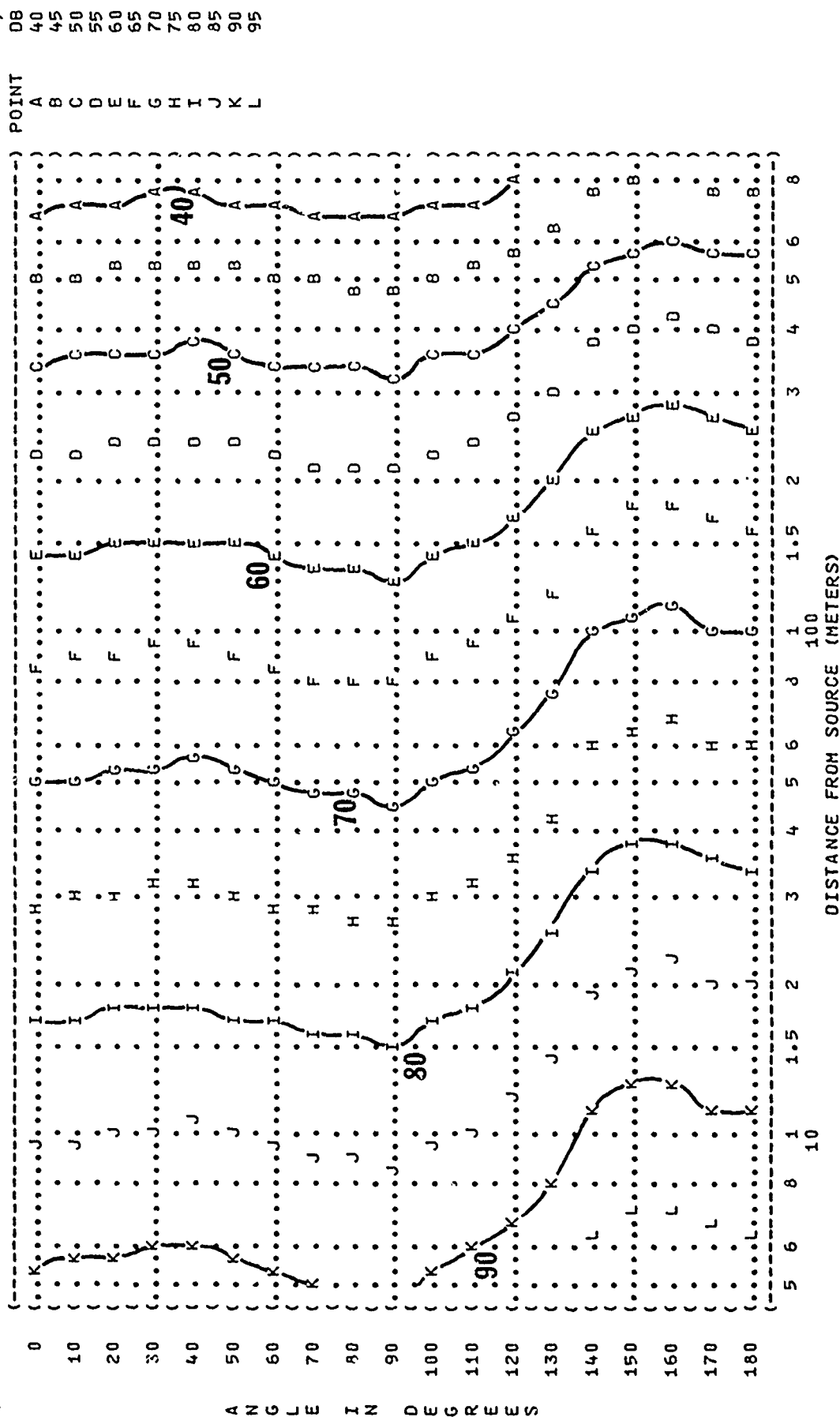
SOUND PRESSURE LEVEL {SPL}
EQUAL LEVEL CONTOURS (DB)
2000 HZ OCTAVE BAND

IDENTIFICATION: OMEGA 1.3

ISE SOURCE/SUBJECT: (OPERATION:
MA-1A POWER UNIT, GAS ((
TURBINE ENGINE ((42,500 RPM
(AIRESEARCH) ((
FAR FIELD NOISE LEVELS ((

TEOROLOGY:
TEMP = 15 C
BAR PRESS = .760 M HG
REL HUMID = 70 %

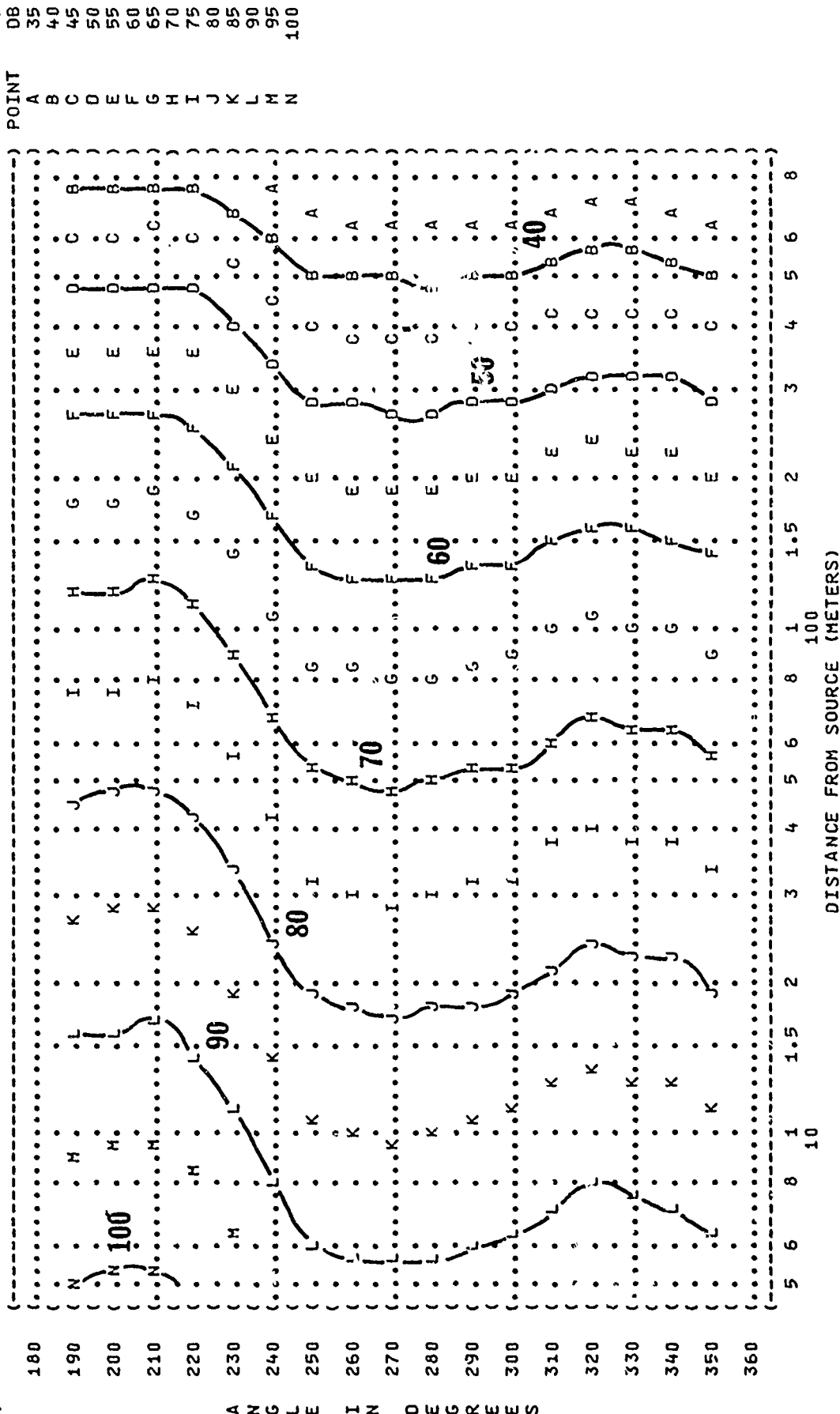
PAGE 22



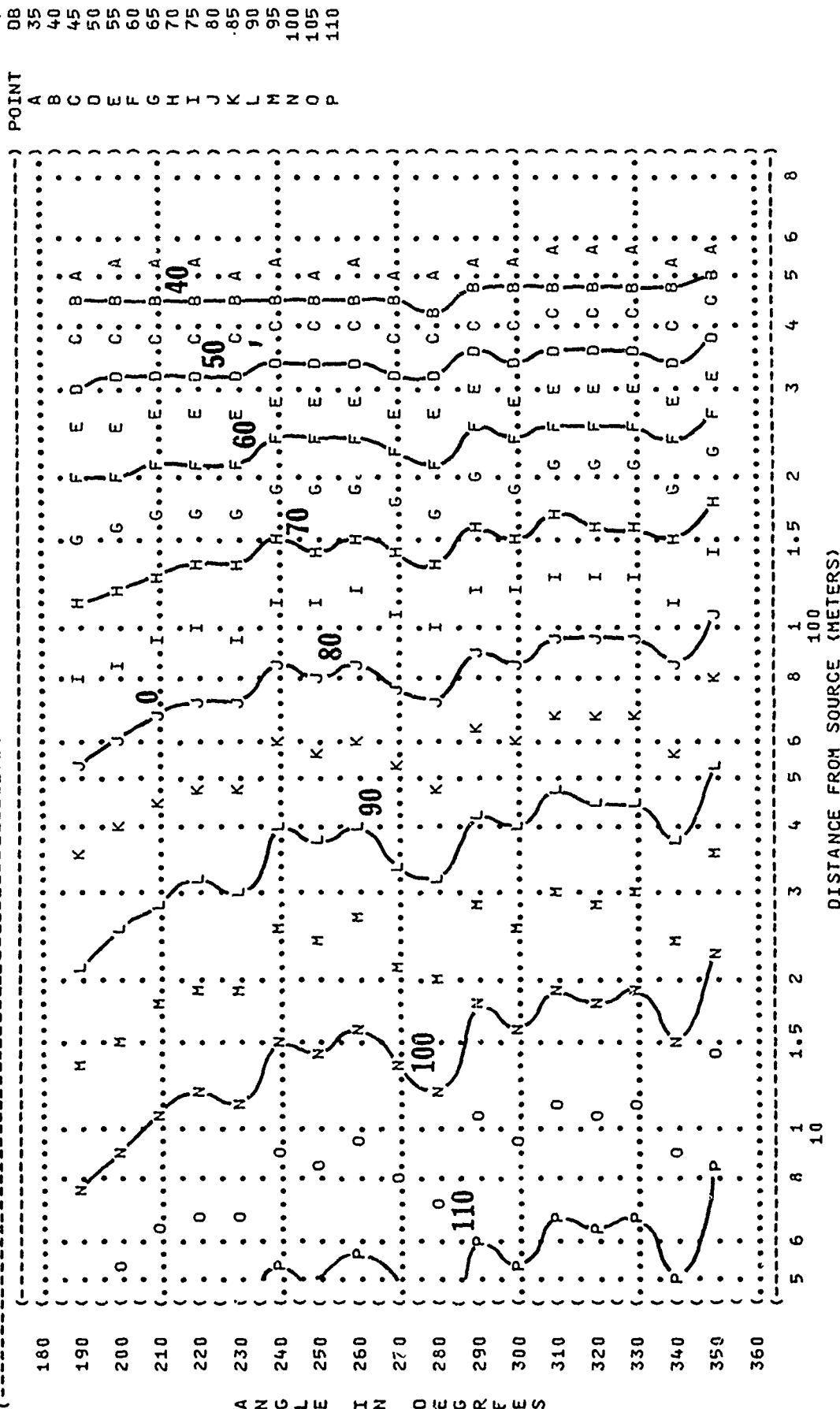
RUN 02
29 JAN 75
PAGE 22



(FIGURE: SOUND PRESSURE LEVEL (SPL))
 (9 EQUAL LEVEL CONTOURS (DB))
 (4000 HZ OCTAVE BAND)
 (NOISE SOURCE/SUBJECT:)
 (HA-1A POWER UNIT, GAS)
 (TURBINE ENGINE)
 ((AIRESEARCH))
 (FAR FIELD NOISE LEVELS)
 (OPERATION:)
 (42,500 RPM)
 (METEOROLOGY:)
 (TEMP = 15 C)
 (BAR PRESS = .760 M HG)
 (REL HUMID = 70 %)
 (IDENTIFICATION:)
 (OMEGA 1.3)
 (TEST 71-020-270)
 (RUN 02)
 (29 JAN 75)
 (PAGE 23)



(FIGURE: SOUND PRESSURE LEVEL (SPL))
 () EQUAL LEVEL CONTOURS (DB)
 () 8000 HZ OCTAVE BAND
 () IDENTIFICATION:
 () OMEGA 1.3
 () TEST 71-020-270
 () RUN 02
 ()
 (NOISE SOURCE/SUBJECT:)
 () HA-1A POWER UNIT, GAS)
 () TURBINE ENGINE)
 () (AIRESEARCH))
 () FAR FIELD NOISE LEVELS)
 ()
 () OPERATION:
 () 42,500 RPM
 ()
 () METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 ()
 () 29 JAN 75
 ()
 () PAGE 24
 ()



REFERENCES

1. Cole, John N., *USAF Bioenvironmental Noise Data Handbook, Volume 1: Organization, Content and Application*, AMRL-TR-75-50 (1), Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio, 1975.
2. Cole, John N., *USAF Bioenvironmental Noise Data Handbook, Volume 2: Procedure to Evaluate Effects of Non-standard Meteorological Conditions on Far-Field Noise*, AMRL-TR-75-50 (2), AMRL, WPAFB, OH, 1975.